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GYNECOLOGY AND OBSTETRICS

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INTERNATIONAL ABSTRACTS OF SURGERY

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COLLECTIVE REVIEW

NONPARASITIC BENIGN CYSTIC TUMORS OF THE SPLEEN

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SURGICAL interest in cysts of the spleen was aroused in 1904 in Germany. The first case of cystic spleen was a dermoid reported by Andral in 1829. The first splenectomy for cyst was performed by the French surgeon Pean, in 1867.

It is now 12 years since a critical analysis of splenic cysts has been made by the writer. A large number of splenic cysts has since been reported. We are now in a better position to evaluate them and to draw more definite conclusions. The present study assembles and critically analyzes new reviews and new individual case reports in the foreign and domestic literature from 1940, totaling 265 cases reported up to May 1, 1952. The analysis also includes the series of Akcakoyunlu who tabulated 21 benign cavernous angiomas in 1938. In tabulating the new cases according to type, the diagnoses of the various reporters are given and in some instances when some doubt is expressed in the writer's mind as to proper classification, suitable comments have been made. In all of the cases reviewed the potential pathogenesis has been especially and constantly borne in mind. In many, no opinion has been expressed, in some a rational causative factor is revealed, and in others there is quite a clear-cut mode of origin.

CLASSIFICATION

Basically, nonparasitic benign cysts are all designated as primary and secondary. The former are true cysts. The term "secondary" is preferable to false cysts because it presupposes a certain pathological ancestry to which the cause may be traced in many cases. An improved classification of nonparasitic cysts was offered in 1940 by the author, based on the pathogenesis and lining of the cyst wall. He believes that his classification is constructive and elucidates clearly the hitherto unexplored etiology. Morphologically, nonparasitic benign cysts are designated as follows:

1. Large, single subcapsular (hemorrhagic and serous) cysts.
2. Large, multiple, communicating, deep multilocular, fused cysts (polycystic disease).
3. Large, multiple noncommunicating cysts with small satellites (hemangiomas).
4. Small, single or multiple, superficial or deep cysts (serous).

The absence of cell lining is not conclusive evidence of secondary cysts. Cell lining may be absent in one part of the wall, which places the cyst in the secondary class, and if repeated microscopic examinations from different parts of the cyst wall are made, the true origin may be disclosed. Lining cells have been found after continued, persistent research (Schawan). Aschoff has pointed out that metaplasia may also alter the picture and disguise the origin.

Degeneration may obliterate the cell lining. All classifications have their shortcomings. The pathogenic classification would appear more popular with the pathologists and is generally accepted.

Kaijser writes from the German viewpoint in 1939: "The classification of Fowler has its advan-

Dr. Fowler died while this review was being prepared for publication.

TABLE I.—REVIEWS OF SPLENIC CYSTS

Reporter	Cases	Year
General, all types		
Powers	32	1906
Finkelstein	66	1909
Fowler, Royal H.	86	1913
Fowler, Royal H.	98	1924
Frank*	111	1930
Benton**	118	1932
Ostro and Makover	126	1937
Fowler, Royal H.	137	1939
McClure and Altemeier	149	1941
Gallagher and Mossberger	155	1942
Harmer and Chalmers	163	1946
Tamaki	168	1948
Fowler, Royal H.	245	1950
	265	1952
Calcified cysts		
Snoke, P. A.	6	1943
Epidermoids		
Schawan, H. K.	4	1933

*Two personal cases should be excluded, one not operated upon, and one in which the spleen was not seen. The count is 109.
**Should be 116 on above basis.

TABLE II.—PATHOGENIC CLASSIFICATION OF NONPARASITIC BENIGN CYSTS (FOWLER)

I. Primary with cellular lining. Component endothelium.
   1. Congenital
   2. Traumatic
   3. Inflammatory
      a. Infoliation cysts
      b. Dilatation cysts; Lymphangiectatic, polycystic disease.
   4. Neoplastic cysts (also congenital)
      a. Epidermoid } noncomponent, epithelium.
      b. Dermoid }
      c. Lymphangioma
      d. Benign, cavernous, and capillary hemangioma.
II. Secondary, no cellular lining.
   1. Traumatic (blood and serous types).
   2. Degenerative (liquefaction).
   3. Inflammatory (necrosis, tuberculosis).

tages and its disadvantages. Anatomically identical formations may be classified in quite different groups to agree with the genesis." He is willing to accept this classification with modifications and suggests a special grouping for cystic tumors originating in congenital malformations, such as hamartoma and choristoma. He suggests also that a group include metastatic cystic tumors. The former are already included among the primary cysts under the neoplastic cysts (congenital). Hamartoma is generally recognized as synonymous with hemangioma. Secondary malignant metastatic cysts have no place in this study which is limited to cysts of benign origin. The choristomas (new growths derived from displaced anlage) are properly placed among the neoplastic cysts of congenital origin. They are exemplified by the dermoid and epidermoid.

Sex. The female is predisposed to both primary and secondary cystic formations in the spleen. In a previous study the author found 60 per cent of the cysts in this sex, as did Pohl. Schottenfeld and Wolfson found the hemangiomas equally divided in the sexes. One case occurred during pregnancy in their series. A study of the potential influences of menstruation and pregnancy was engendered by their more common occurrence during the childbearing age. Cystic tumors have occurred in women with menstrual irregularities, in multiparas, and in the course of pregnancy. Seventy per cent of the cysts occurring in pregnancy were large solitary hemorrhagic cysts which in some instances showed rapid growth. It has been stated by Monnier that congestion of the spleen occurs during menstruation and pregnancy, and on this basis he attempts to correlate a definite relationship with the development of splenic cysts. Benton credits Frank with convincing evidence of the connection between menstruation and splenic congestion. A very large abdominal cyst was marsupialized by Frank. The spleen was not seen. A sinus persisted, which discharged blood during menstruation. There was doubt as to the origin of this cyst. It was probably ovarian. This relationship may have been suggested in the case of a large splenic cyst in a woman reported by Dobrzaniecki, but its certainty was doubtful. The patient had painful, profuse, prolonged menstrual periods from maturity to the age of 38, when splenectomy was performed with relief from the symptoms. The author suggests that the relief of pressure in the pelvis due to the splenic cyst may have been a factor in this alleviation. Subbotic and Nuernberger both agreed as to the relationship of the spleen to menstruation and recommended x-ray irradiation of the spleen in the control of gynecologic functional hemorrhage. In a case of malarial splenomegaly with cyst formation and amenorrhea for 2 months, which was reported by Subbotic, splenectomy was followed by the return of normal flow in 24 days. Again, relief of pressure on the pelvic organs may have resulted in the normal flow. A rational explanation of the development of large solitary secondary cysts following pregnancy is that embolism leading to infarction, secondary hemorrhage, and degeneration may eventuate in cyst formation. This explanation also holds good in the cases of Bircher and Downs. In the new cases studied since 1940 the sex incidence remains at 60 per cent for females and 40 per cent for males. This applies to both primary and secondary cysts. Further study of the cases since 1940 reveals no

TABLE III.—AGES OF PATIENTS WITH SPLENIC CYSTS IN DECADES

Ages of Patients	Primary cysts								Secondary cysts							
	Lymphangioma		Hemangioma		Epidermoid		Endothelial and Cuboidal		Secondary cysts		Calcified secondary		Calcified primary	
Under 1 yr.				1		1								
1–10		1				4		1						
10–20	60%	3	51%	2	100%	11	100%	3	78%	9		2		3
20–30		5		2		3		5		16	62%	2	85%	2
30–40		2		10		1		1		11		2		1
40–50	3		9		—		—			8		4	1	
50–60	3		3		—		—		5		3		—	
60–70	—		2		—		—		4		3		—	
70–80	1				—		—		3		—		—	
Extremes of ages	15 mo. 74 yr.		4 mo. 67 yr.		under 1 yr. 40 yr.		under 10 yr. 40 yr.		under 20 yr. 80 yr.		under 20 yr. 70 yr.		under 20 yr. 60 yr.	

In this Table it is noted that the majority of both primary and secondary cysts occurred in patients under 40 years of age; that 100 per cent obtained for epidermoids, endothelial and cuboidal lined cysts up to 40 years. The primary calcified cysts were in line with the 4 categories of this variety in patients up to 40 years. In the case of hemangiomas, 51 per cent only occurred in patients up to 40 years. This is explained by the large number of autopsies in this class, with terminal deaths from other causes. Tuberculous cysts occurred most often in patients between 20 and 40 years of age; the limits were 1 to 90 years.

additional information with respect to the influence of menstruation and pregnancy.

SIZE, SHAPE, LOCATION, AND GEOGRAPHICAL DISTRIBUTION

The large, solitary, unilocular cyst was found in about 80 per cent of the cases, and in 65 per cent of these the cysts were subcapsular. In 35 per cent the cysts were situated deeply within the organ. In the former a bulging capsule formed a large part of the outer wall of the cyst. The single cavity might occupy two-thirds of the organ or more, which left but a narrow peripheral rim. The cysts might be as large as a football and weigh as much as 13,130 gm. Scattered and fused cysts were found in 20 per cent of the cases.

In the majority of cases, the cysts sprang from the lower pole. Cysts were located at the hilus, at the anterior border, at the upper pole, and, less often, at the posterior border. The location of the cyst depended upon the position of the spleen. Cysts have occurred in wandering spleens, as noted in the case of McMurtry which was diagnosed as movable kidney. Kummaris' dermoid was freely movable as was the cyst reported by Dowidar, which wandered. When the patient stood such spleens descended into the pelvis. With the patient supine they receded or might be pushed back beneath the left lower ribs. Variation of the pedicle was noted in the case of large cysts by Sweet and others who observed its entrance at the lower pole. Cysts of the spleen have occurred not only in human beings but in the dog, monkey, and ox.

The geographical locations of cysts of the spleen have been reported as Arabia, Austria, Australia, Canada, Ceylon, Cyprus, France, Germany, Great Britain, Greece, Italy, Japan, New Zealand, Norway, Poland, Puerto Rico, Russia, Sweden, Turkey, and the United States.

INCIDENCE

Compared with the frequency of cysts of the other abdominal organs, cysts of the spleen are rare. This is shown by the record of only 137 cases up to 1940. In the present study of 265 cases reported up to May 1, 1952 we find that the number of primary cysts has increased; 110 cases of primary cysts have been tabulated. Of these, 27 were lymphangiomas, 48 hemangiomas, 2 dermoids, 23 epidermoids, and 10 endothelial lined cysts. There were 155 cases of secondary cysts of which 66 are tabulated. This type is still more common and comprises 58 per cent of all cysts.

PATHOGENESIS

In the absence of retention cysts one must look to the sinuses, the lymphatics, and blood vessels for an explanation, especially in the case of primary cysts. An association has been demonstrated between nonparasitic cysts of the liver and congenital anomalies, especially of the kidney. There may also be an analogy in splenic cysts as suggested by the case of Jamison and Smith. These authors report a primary calcified cyst associated with a congenital bifid renal pelvis and suggest its origin might have been in a congenital peritoneal inclusion. Frank and Howald

TABLE IV.—SYMPTOMS AND OBJECTIVE FINDINGS IN HEMANGIOMAS ACCORDING TO SCHOTTENFELD AND WOLFSON

	No. of cases	Per cent
Tumor	16	100.0
Pain	10	62.5
Secondary anemia	2	12.5
Ascites*	2	12.5
Weight loss	3	18.7
Fever	2	12.5
Asthenia	3	18.7
Dyspnea	2	12.5
Jaundice	2	12.5
Leucocytosis	1	6.2
Chills	1	6.2
Constipation	1	6.2
Leucopenia	1	6.2
Pruritus	1	6.2

*Ascitis does not occur in simple benign hemangiomas. It is likely that these were malignant.

are of the opinion that all large cysts are primarily small cysts and result from the dilatation of lymph spaces. A study of the fluid contents or cell lining gives little information. Aschoff has pointed out that the character of the cell lining is not a proof of origin. Endothelium of the lymph vessels could be transformed into cuboidal epithelium. It must also be borne in mind that some cysts designated as "secondary" lose their cellular lining from degeneration.

I. Primary cysts by invagination.

1. Congenital serous cysts. Pepere of the Italian school contends that all serous cysts originate from cellular nests which remain under the capsule from abnormal invagination of the perisplenium during the development of the organ. This occurs in the bottom of sulci which separate the primitive lobes that gradually fill up as the organ develops. That is why serous cysts are frequently located superficially. The result is similar to that which occurs in the pelvis of the kidney, the ureters, the bladder, and in the nests of von Brun's cells, which are transformed into pyelitic, ureteral, and bladder cysts, respectively. Cases of cysts of the kidney have been reported by Kliffel and Lefas, also by Goldberg. Further analogies are found in the occurrence of subserous epithelial cysts in the diaphragm and the epicardium, of embryonal genital residues on the surface of the tubules in the liver, and in the occurrence of cortical cysts found in the adult ovary. Pepere holds that all small cysts of the spleen, multiple or isolated, subcapsular or in the perisplenium, must be considered etiologically equivalent. Renggli places the origin of cellular lined cysts in the period of embryonic development when the peritoneal endothelium shows its original cuboidal character. Schmidt, recognizing the presence of lymphatics in the capsule, believes lymph cysts develop embryonically from snared-off peritoneal endothelium because he has found small superficial cysts, the cut surface of which showed a cavernous structure. Misplaced lymph vessels or cells of origin may become snared off during fetal life, proliferate, and also eventuate in the large, deep, multiple-fused cystic cavities. Lau also incriminates abnormal developmental anlage. The influence of an abnormal anlage of blood vessels in the formation of hemangiomas may also be a factor.

2. Traumatic cysts by infoliation. Beneke is of the opinion that small multiple-surfaced cysts originate from infoliation of the peritoneal endothelium in consequence of spontaneous rupture of the splenic capsule. He and his pupil, Ramdhor, believe splenic tissue protrudes through these ruptures, which he terms "hernias of splenic tissue," and becomes snared off between neighboring areas of parenchyma to form superficial cystic cavities.

3. Inflammatory cysts by infoliation. Renggli described cysts of the spleen lined with cubical epithelium. He also explains the occurrence of deep multiple cysts from snared-off peritoneal endothelium, but substitutes inflammation for trauma as a precursor. He believes that in consequence of fusion of inflamed proliferated areas on the surface, the endothelium becomes snared off, and in situations where such areas have been pressed deeply into the splenic tissue, the endothelium is stimulated to energetic growth and cyst formation, the cyst coming to lie deep in the parenchyma. He considers that the single layer of cuboidal epithelium lining these cysts is the same as that which composes the peritoneum, except that the peritoneal endothelium has become flattened from the pressure of neighboring organs. Otto considers that only small superficial cysts possessing a flat layer of cells unsurrounded by splenic tissue may have this origin. Kuehne has dealt with the subject and after investigation concluded that the theory of Renggli is quite reasonable and holds good in 1 of his 3 cases. Wohlwill believes that trauma is not essential to the development of infoliation cysts, but that spontaneous rupture of the splenic capsule and hernia of tissue ensue from a rapid swelling of the organ. As the spleen continues to enlarge, rupture takes place at various points and the peritoneum becomes turned-in and snared-off. It is thus seen that infoliation cysts may be either congenital, traumatic, or inflammatory.

4. Dilatation cysts. Lymphangiectatic and polycystic spleens have their origin in the lymphatics.

Billroth is credited with the first exact description of the splenic sinuses. Ruysch first discovered lymphatics in the capsule. Fink first described lymphatic cysts in 1883 and was the first to be successful in proving histologically the transition of dilated lymph channels to large cystic cavities. Schmidt believed both capsules and trabeculae contained lymph spaces and thus explained both superficial and deep-lying cysts. Kuehne and Jamischita believe that cysts develop from lymph spaces in the perisplenium and trabeculae. Pepere agrees with Schmidt and Mueller that the lack of connection and continuity of cysts with lymph vessels does not constitute sufficient reason to exclude their origin from the latter. Pepere does not exclude the possible formation of lymph cysts in the subcapsular portions of the spleen. Tomsa concluded from his study of a horse spleen that the deep lymphatics drain through the trabeculae into the capsule. Kyber corroborated this by injecting silver salts. Katsuki, in 1925, demonstrated the origin of the trabecular lymphatics in the malpighian bodies in cattle by the injection of India ink and cinnabar. Opinions in support of Fink's lymphatic origin are held by Kuehne, Aschoff, and Schmidt. Other earlier investigators, including Baum, were emphatic in their denial of the existence of deep lymphatics. Mall, in 1900, recognized only superficial lymphatic vessels. Like opinions were held by Weidenreich, Bartel, Ziegler, and Jossifow. This opposition delayed confirmed recognition of the relationship of true cysts to the deep lymphatics.

TABLE V.—NONPARASITIC BENIGN CYSTIC TUMORS OF THE SPLEEN

No. of cases	Sex		Splenectomy	Result		Mortality from splenectomy	
	F	M		Recoveries	Deaths		
Primary Cysts*							
Lymphangioma							
27	11	4	(1 excision of cyst) 10	(1—10)	(0) 0	none	
Hemangioma							
48	15	14	26	22	4	18 per cent	
Dermoid							
2	1	—	Marsupialization	1	0	none	
Epidermoid							
23	10	10	17	16	1	6 per cent	
Endothelial and cuboidal cysts							
10	8	2	10	10	—	none	
110	45	30	63	58	5	8 per cent	Total
Secondary cysts (includes secondary calcified cysts)							
						Mode of origin	
66	24	15	47	47	0	none 26	Total
176	69	45	110	105	5	4 per cent —	Grand total

*All reported cases.

5. Benign neoplastic cysts. The dermoid and epidermoid are congenital. The dermoid contains noncomponent elements of ectodermal origin—hair, sebaceous material, and keratin (Andral, Kumaris). The genesis of dermoids rests upon autochthonous formation or embryologic misplacement. The occurrence of epidermoids (also noncomponent structures) is now well established. The true diagnosis may be overlooked. The exact nature of such a cyst reported by Schawan was discovered only in a check-up 9 years later. The epidermoid of Parker and Brown showed hair at operation in the cystic fluid, but this was not confirmed later in the laboratory. Based on the presence of stratified squamous epithelium, keratinization, and prickle cells, the diagnosis of epidermoid would appear to be clear according to Bostick and Lucia. Parker and Brown suggest the term "metaplastic mesodermal" cysts for epidermoids as being more accurate embryologically and developmentally. "Metaplastic mesodermal cysts," according to Bostick and Lucia, "must be at least partially lined with stratified squamous epithelium. The difficulty of classification lies in determining whether the lining of squamous cells is true epithelium rather than transformed mesothelium or endothelium. The distinction cannot always be made. However, there may be present certain identifying characteristics which should be evaluated in order to give accuracy to the supported incidence of true splenic cysts derived from epithelium." The ontogenesis of the spleen offers little aid in the problem except to emphasize that true epithelium is not involved in the development of the spleen. The recent work of Thiel and Downey dismissed the possibility of an endodermal contribution to the development of the normal mammalian spleen. In regard to the wolffian bodies, they are spatially too remote to be considered as sources of cystic anomalies of the spleen although Santy has advanced this hypothesis. Because of the prominence of mesenchymal cells in the normal development of the spleen, the statement that a primary tumor has originated from epithelium must be made with great care and any possibility that the tumor was derived

TABLE VI.—LYMPHANGIOMA—POLYCYSTIC DISEASE

Reporter	Sex	Age	Splenectomy	Result
Warren Museum Harvard College	Details lacking		Autopsy	—
Fink—4 cases 1	Male	48	Autopsy	—
2	Details lacking		Autopsy	—
3	Details lacking		Autopsy	—
4		14	Partial splenectomy	Recovery
Kuehne—2 cases 1	Details lacking		Autopsy	—
2	Details lacking		Autopsy	—
Barbacci	Details lacking		Autopsy	—
Brandts	Case in dog		Autopsy	—
Boeckelmann		15 mos.	Yes	Not stated
Coenen*	Female		Yes	Recovery
Fowler**	Female	22	Yes	Recovery
Heinricius	Male	14	Yes	Recovery
Subbotic	Female	30	Yes	Not stated
Brandberg				
Suschanek	Male	12	Yes	Recovery
Sprague, E. W.	Female	21	Yes	Recovery
McLaughlin and Beck†	Female	42	Yes	Recovery
Krumbhaar	Details lacking			
Culver, Becker and Koenig	Female	25	Yes	Recovery
Deneen—Bellevue Hospital	Details lacking			
Goldberg, Samuel (2 cases)	Female Female	56 55	Autopsy Autopsy	— —
Sherwin, Brown, and Liber††	Female	46	Yes	Recovery
Bostick and Lucia	Female	26	Yes	Recovery
Bostick, W. L.	Male	35	Autopsy	—
Williams, Robert W.	Female	74	Splenectomy	Recovery

*Removed during pregnancy.
**History of trauma, removed following pregnancy.
†Diagnosed as cystic lymphangioma, but lining cells were stratified squamous epithelium.
††Diagnosed as multiple cystic disease, probably lymphangioma.

from mesenchyme must be definitely disproved. An occasional cluster of multiple-layered cells is not sufficiently characteristic for differentiation between epithelial, mesothelial, or endothelial origin of a cyst. This is true especially because much of the reported stratification occurs in crevices and recesses within the cyst wall and these may be fortuitous. In regard to intercellular bridges, they are suggestive of ectoderm, but Heidenhain reported their presence in cells lined with mesoderm. If, in addition to stratification and the presence of intercellular bridges, keratinization occurs, the point in favor of a true epithelial origin becomes certain. Lereboullet, Gregoire, Bernard, and Ibarran reported a "granular layer containing eleidin granules" in the cells of the cyst, but they have been the only ones to find a suggestion of prekeratotic change. In regard to the significance of associated satellite cysts, their cytologic character should be a major contributing factor in the decision as to whether the observed stratified cellular lining of a cyst represents simple multiplicity of the mesenchymal cell layers or layering of the true epithelium.

Other primary benign neoplastic cystic tumors, lymphangiomas and capillary and cavernous hemangiomas are congenital. Lubarsch, in case of cystic lymphangiomas, assumes a faulty embryonic anlage. He states that 50 per cent of the cases involved youthful individuals up to 30 years of age. The presence of ridgelike high and low projections in the interior of the cavities can be explained only by an increased growth of individual thin-walled cysts which have become fused and have ruptured into each other to form large cavities. Lau also explains his cystic lymphangioma on the basis of developmental disturbances.

Lymphangioma is characterized by cellular stroma containing lymphocytes, endothelial cells, and especially budding vessels. It is possible that a careful re-examination of microscopic sections removed from different portions of the wall of so-called polycystic spleens may reveal "budding vessels," thus placing them in the proper category. Brandberg supported Howald and others in stating that the association of small microscopic cysts with large cysts is evidence that the lesion represents a lymphangioma. He further stated that bloody fluid contents and pigment in the wall do not exclude a lymphangioma and that an endothelial lining is not of paramount importance. He then assumes on this basis that all cysts, small and large, are of lymphatic origin. Passive dilatation is given as a cause of lymphatic cysts, and while lymph stasis doubtless influences the course of many lymphangiomas, it is well known that edema and varicosities are the most frequent results of lymph channel obstruction. Ribbert argued that any marked pressure would inhibit the growth of endothelium and assumed that lymphatic cystic tumors develop as a result of a process of growth located in the walls which steadily enlarges the cysts and prevents the passive accumulation of fluids. McLaughlin and Beck, applying the principles of hydraulics to these

channels, state, "one must assume that there is a diminishing gradient of pressure of fluid from the areas where the lymph is formed to the point where the lymph finally empties into the venous system. Suppose an obstruction is placed in the course of the channel and completely blocks the flow of lymph; the adjustment of pressures is such that the increase in the obstructed channel cannot exceed the pressure in the areas of origin. The pressure rises in this channel only to a point equal to that of the lymphatic capillaries; hence, the widening is no greater than the manifestation of edema in any complete mechanical blockage widespread enough to impede the flow of lymph through anastomotic and collateral branches." The effect of pressure is slightly different if a small channel empties into a large blind cavity. This follows Pascal's law which states that liquids transmit in all directions any pressure that is applied to them. This principle is applied to the hydraulic press. It may therefore be assumed that the force exerted on the wall of such a cavity is to the force in the small channel as the area of cross section of the cavity is to that of the channel. It is possible for the fluid in minute afferent channels to exert remarkable pressure in a fluid-filled cavity without the effect of excessive pressure on the channels themselves. Also, according to Bernoulli's theory, increased fluid pressure in a widened portion of an unobstructed channel is to be expected and this pressure will continue to increase as the cross section of the widened part of the channel is increased. These principles under suitable conditions can account for much pressure in cysts where there is no obstruction to the flow of fluid, which causes them to enlarge by mechanical dilatation without an associated edema. The proliferative process in lymphangioma is simple hyperplasia. If the rate of proliferation keeps in advance of the intracystic fluid pressure, budding, proliferated areas, and multiple cyst formations may be seen microscopically (Ribbert). This picture has been described by Brandberg and others and is usually associated with numerous small cysts and cavernous spaces. On the other hand, if the rate of increase in pressure within the cysts exceeds the proliferative rate, it is logical to expect the results of excessive pressure. These are flattening of the lining cells, inhibition of growth (Ribbert), and finally degeneration. This picture is common and the cysts are usually of the large type. Within the two extremes many variations are possible. McLaughlin and Beck carefully dissected a lymphangioma. The intrasplenic vessels were found to have an abnormal relationship, second-

TABLE VII.—HEMANGIOMA

Reporter	Sex	Age	Splenectomy	Remarks	Result
Goldberg, Sam'l (2 cases)	M	67	Autopsy	Also cyst of r. kidney	—
	F	45	Autopsy		—
Schottenfeld and Wolfson	F	31	Yes		Recovery
Reich and Van Tassel	F	25	Yes		Recovery
Haines and McIlroy	F	45	Yes	Spontaneous rupture	Death
Nessler, Faber and Leik	M	40	Yes	Spontaneous rupture	Recovery
Kellert	F	52	Yes	Old infarction	Recovery
Krumbhaar	1 in 6,500 autopsies				
Akcakoyunlu	M	30	Yes		Recovery
Hodge, Jr.	F	48	Yes		Recovery
Martin and Ombredanne	F	31	Yes		Recovery
Albrecht	M	65	Yes		Recovery
Theile (3 cases)					
1	M	22	Autopsy		—
2	M	36	Autopsy		—
3	M	62	Autopsy		—
Martin	—	—	Yes		Recovery
Benkendorff, von	M	53	Yes		Recovery
Angilotti	F	38	Yes		Recovery
Mueller	M	30	Autopsy	33 capillary nodules	
Stedin	M	42	Yes	Wt. 4,125 gm.	Recovery
Naeher	F	42	Yes	Wt. 2,500 gm.	Death
Orlandi	F	44	Yes		Death
Mason	F	17	Yes		Recovery
Schwartz	F	35	Yes	Wt. 3,500 gm.	Recovery
Zeno and Cid	M	30	Yes	Wt. 5,800 gm.	Recovery
Wassiljeff & Pratassewitch	M	30	Yes		Recovery
Plavecino, Villegas and Palazon	M	41	Yes		Recovery
Mikami	F	45	Autopsy		—
Deneen	Details lacking				
Cole and Forsee	M	27	Yes	Rupture	Recovery
Hodge and Wilson	(col. F)	35	Yes		Recovery
Jayasuriya	N.S.	—	Yes	Wandering spleen	Recovery
Dawson	—	—	Yes		Recovery
Stuhlinger	—	—	Yes		Recovery
Lubarsch	3 cases of angioma in 19,000 autopsies.				
Ugriumow	2 cases of angioma, wt. 2,300 and 1,635 gm.				
Ewing, James	Found 13 cases in the literature up to 1913.				
Aronson and Fox	M	26	Yes	Rupture	Death
Bostick, W. L.	M	21	Autopsy		
Pines and Rabinovitch	Details lacking				
Grove	F	4 mos.	Yes		Recovery
Dowd	Details lacking				
Homans, John	Details lacking				
Huntington	Details lacking				
Moschowitz	Details lacking				

TABLE VIII.—DERMOIDS

Reporter	Sex	Age	Splenectomy	Result
Andral			Autopsy	—
Kummaris	Female	40	Marsupialization	Recovery

ary to cystic enlargement. These authors attempted to show that the hydraulics in connection with the rate of proliferation simplifies the problem of pathogenesis of these cystic tumors. Primary congenital benign vascular cystic tumors, angiomas, capillary and cavernous hemangiomas, telangiomas and hamartomas are the same in origin and pathology (Lubarsch). Kellert believes that some reported hemangiomas are embryonal anomalies because of the lack of distinct nodules or connective tissue framework and the retention of the splenic outline. Some oncologists question the neoplastic nature of the cavernous angiomas. The simultaneous presence of angiomas in several organs or structures is not evidence of metastases because angiomas are frequently benignly multiple and their histology is quite distinctive (Pool and Stillman). The cavernous angioma is a tumor composed of newly formed blood vessels developing on the basis of a congenital nevus and tends to enlarge over the years. When allowed to progress, the growth may attain very large dimensions. It enlarges by distention of the original vessels and by the formation of new vessels. Anastomosis with large arteries or veins may be established and severe or fatal hemorrhage may occur. The pathogenesis of the cavernous angioma is not complex. It consists of a meshwork of fibrous tissue which encloses blood-filled sinuses of varying size and shape. In simple hemangioma the connective tissue is noncellular. By means of interstitial injection Ribbert found that the vessels in the simple hemangioma have few or no lateral anastomoses, from which he concluded that the tumor is an isolated segment of the vessel wall and produces varicosities in closed territory. The origin of the hemangioma must be referred to a developmental anomaly in the structure of certain vascular segments which do not fit into the circulatory system and which retain embryonal characters. The congenital origin speaks strongly in favor of a tissue predisposition as a prominent factor in their genesis.

SECONDARY CYSTS

Antecedent disease shows an intimate causal relationship to secondary cysts. Of the many causes of splenomegaly which predispose to spontaneous or traumatic hemorrhage and cyst formation, malaria is of great importance. There are

TABLE IX.—EPIDERMOIDS

Reporter	Sex	Age	Splenectomy	Result
Dinand	Male	16	Yes	Recovery
Pohle	Female	19	—	
Schneider	Male	14	—	
Montgomery, McEnery and Frank (2 cases)	Female	7	Yes	Recovery
	Male	6 mos.	Retroperitoneal drainage for hydronephrosis. 6 weeks later nephrectomy and splenectomy	Death
Schawan*	Female	16	Yes	Recovery
Santy	Male	15	—	
Harding	—	—	—	
Weil, Rouxberger and Scemama§	Female	15	Yes	Recovery
Bergan†	Male	25	Yes	Recovery
Lereboullet, Gregoire, Bernard, and Ibarran	Male	8	Yes	Recovery
Parker and Brown‡	Female	16	Yes	Recovery
Bostick and Lucia	Male	20	Yes	Recovery
Paul	Female	19	Yes	Recovery
Gosset, Betrand and Gosset	Details lacking			
Jameson and Smith	Male	18	Yes	Recovery
Lang, Morton, Steele and Schaeffer	Female	39	Transthoracic rupture into pleura	Recovery
Custer¶	—	—	—	—
Lahey Clinic♦	Male	8	Yes	Recovery
Carnett, Bates and Linney	Female	11	Yes	Recovery
Rodakovich, Michael	Female	17	Yes	Recovery
Elias and Linn	Male	22	Yes	Recovery
Bostick, W. L.	Female	14	Yes	Recovery

*History of trauma.
§History—trauma.
†Doubtful. Squamous lined mesenteric cyst?
‡Hair was found in cystic fluid at operation but not in Pathologic Laboratory.
¶1 autopsy in 5,000.
♦Origin in pancreatic tissue? Epithelial inclusion.

two mechanisms which may be the cause of hemorrhagic cyst development in the malarial spleen from spontaneous rupture. The first consists of a tear occurring in a fissure or through the parenchyma without subcapsular hemorrhage. The more frequent mechanism consists of the formation of a subcapsular hematoma which may ultimately rupture. Malarial parasites after entrance and dissemination become localized predominantly in the spleen which undergoes marked hypertrophy and hyperplasia. The splenic corpuscles show striking proliferation. The lymphoid structures undergo necrosis. Embolic occlusions of the

TABLE X.—ENDOTHELIAL AND CUBOIDAL LINED CYSTS

Reporter	Solitary or multiple	Age	Sex	Trauma	Splenectomy	Result	Remarks Origin
Peck, C. H.	Solitary	26	M (colored)	—	Yes	Recovery	Primary tuberculosis
Roberson	Solitary	23	Female	—	Yes	Recovery	
Watts and Warthen	Solitary	14	F (colored)	—	Yes	Recovery	Developmental inclusion
Kaijser	Solitary	21	Female	—	Yes	Recovery	
Harmer and Chalmers	Solitary	24	Female	Yes	Yes	Recovery	Endothelial cells on repeated later examination
Tamaki	Solitary	15	Male	Yes	Yes	Recovery	Traumatic rupture from fall
Sweet	Solitary	8	Female	—	Yes	Recovery	Cuboidal lymph sinuses?
Pisa and Sikl	Multiple	23	Female	Yes	Yes	Recovery	Fetal peritoneal inclusion
Whitham, Garlinghouse, Tanner and Moesner	Solitary	13	Female	—	Yes	Recovery	Trabeculated type simulates lymphangioma
Stahl and Stahl	Solitary	32	Female	—	Yes	Recovery	

capillaries and arterioles result in punctuate hemorrhages and toxic necrotizing lesions throughout the spleen. The boggy splenic pulp with its increased fragility in an already greatly enlarged spleen predisposes to spontaneous rupture of the first type. When a large vessel is involved splenic infarction and hemorrhage may be sufficient to form a large subcapsular hematoma. The resultant disproportion between the size of the spleen and the resistance of the capsule predisposes to rupture of the second type. Gosselin reports a large cyst due to infarction from complete block of the splenic artery. Spontaneous rupture of intraparenchymatous blood vessels with development of subcapsular or deep-lying hematomas occurs not only in malaria but in leukemia, infectious mononucleosis, typhoid fever, pneumonia, tuberculosis, hemophilia, undulant fever, endocarditis lenta, portal vein thrombosis, and pregnancy. Hemorrhage continues until there is sufficient increased tension within the hematoma to compress the bleeding site or cause intraperitoneal rupture. When organization with the subsequent formation of a fibrous wall occurs an encapsulated hemorrhagic cystic structure results. Later, with the absorption of blood pigment the hemorrhagic cyst may be converted into the serous type. Histories of syphilis, purpura, bilharzic infection, and mumps have been reported. The majority of secondary cysts showing previous disease were the large unilocular type with hemorrhagic contents. Hypertrophied spleens are more likely to be the recipient of injury and consequently a traumatic hematoma could form. Perisplenic adhesions are also prone to occur in hypertrophied spleens. There may be some relationship between perisplenitis and the formation of cysts. Brunswig-Le Bihan states that in Arabs hemorrhagic cysts due to rupture restricted by adhesions are not uncommon. It is conceivable that spontaneous rupture of a distended capsule from congestion might predispose to infoliation cyst formation. The relaxation and shrinking upon subsidence of congestion leaves the capsule in a wrinkled state with countless furrows which may become sealed off. Subbotic observed small multiple surface cysts in malarial splenomegaly which originated in this way. Cysts may occur within the parenchyma of the spleen, the result of endarteritis. Harnett considered the spontaneous rupture of such a blood vessel responsible for a case which he observed in a man who gave postmortem evidence of syphilis. Bednar stated that cysts of the spleen are frequently associated with pemphigus and describes a small cyst occurring in a child 1 week old who was born with the disease. In a case observed by Fereal a large splenic cyst formed during an attack of mumps.

CALCIFIED CYSTS

The nature and method of deposit of calcium in the spleen is still obscure. Schawan suggests that calcification may result from miliary tuberculosis or foci of infection, or it may be the late result of trauma. The tuberculous cyst reported by Charles Peck was not calcified. Moynihan's case was a calcified cyst. Calcification has been reported in primary cysts but is more common in secondary large solitary hematomas. It may occur in 2 years or less as indicated by a report of a case in which previously roentgenography for gall stones failed to show the calcified cyst (Snoke). The writer suggests it may be nature's effort to prevent further hemorrhage or to localize the lesion by encapsulation. It does not occur exclusively in older groups. In some cases calci-

fication was not a marked feature. Such cases have been reported merely as solitary cysts.

The influence of trauma in large secondary cysts is predominant. The injury has been a direct blow or fall upon the abdomen. Long-continued pressure of the left lower chest against a machine was mentioned in one case, and a penetrating wound of the abdomen involving the spleen was mentioned in another. It is seen that secondary hemorrhagic cysts develop following trauma in 80 per cent of the cases. Study of the intervals between trauma and the development of cysts showed that 39 per cent of the cysts developed in 1 year, 11 per cent in 3 years, 39 per cent in 10 years, 5.5 per cent in 12 years, and 5.5 per cent in 40 years; thus, half of them developed within 3 years after the injury.

TABLE XI.—PRIMARY CALCIFIED CYSTS

Reporter	Type	Sex	Age	Splenectomy	Remarks
Culver, Becker and Koenig	Angioma	F	25	Yes	Recovery
Jamison and Smith	Epidermoid	M	18	Yes—Bifid kidney pelvis	Recovery
Paul	Epidermoid	F	19	Yes	Recovery
Spillman	Endothelial	M	51	Autopsy	—
Harmer and Chalmers	Endothelial	F	24	Yes	Recovery
Mason	Hemangioma	F	17	Yes	Recovery
Lang, Morton, Steele, and Schaeffer	Epidermoid	F	39	Transthoracic	Recovery

PATHOLOGY

Primary cysts. In the case of multilocular fused cysts of lymphatic origin the spleen is lobulated and enlarged as a whole. The criterion of a lymphangioma lies in the presence of budding cells in the lymph sinuses. The cases of Goldberg and the author are typical examples. The author's case has been reported previously.

The benign angiomas range from simple localized or widely diffused ectases to more or less nonencapsulated nodules. In the capillary type there is a formation of dilated vascular channels in the splenic tissue which become converted into tubules. In the cavernous hemangioma the capillary system is lost and consists of a series of freely communicating spaces of varied sizes lined with endothelium. The vascular channels are widely dilated and the connective tissue septum is thin. It is comprised primarily of new blood vessels which begin by the budding of endothelium from a segment of a vessel with the formation of new vascular spaces. To a large extent hemangiomas have a closed vascular system and do not communicate freely with the normal vascular bed. They tend to displace rather than to replace the surrounding parenchyma.

Dermoids and epidermoids. These congenital cysts of noncomponent structures are the rarest of the primary cysts. Two cases of dermoids have been reported by Andral and Kumaris. Two recent cases are reported, one by Castleman in a personal communication diagnosed as dermoid, the detailed findings of which are not available, and the other reported by Parker and Brown (?). Epidermoids may present a difficult problem in diagnosis. They are lined by several layers of squamous cells which often possess intercellular bridges but are without keratinization or epidermal appendages. The description given by Schawan is typical. In his case the large cystic epidermoid had an inner lining of varying layers of stratification. The stratified epithelium resembled the epidermis but was unlike it in the absence of hair follicles, sweat glands, papillary layer, and cornification. Gosset and his collaborators also point out that careful and repeated sectioning of the cyst wall is essential.

Secondary solitary hemorrhagic and serous cysts have no cell lining. A large proportion of these are old or recent subcapsular hematomas. The wall is composed superficially of the capsule and is surrounded by parenchyma which may be almost obliterated. The wall is composed of connective tissue and may be hyalinized or it may contain calcium (cartilage: Foerster, Mattei, Powers; or smooth muscle (?): Bryan). The contents vary according to the age of the cyst. They may contain as much as 10 liters of blood and weigh 13,130 gm. The blood may be coagulated or fluid, and black, red, or brown depending upon the stage of its alteration. The contents are usually fluid, thin, and cloudy, or they may remain thick. The interior may be irregular and show no definite encapsulation, rough or smooth, and laminated or trabeculated. Old colliquative cysts may present necrotic walls, thick walls, or no walls, and show no evidence of embolism or infarction. Degenerated blood residues are usually present in old cysts. Spontaneous or traumatic intraparenchymatous hemorrhagic cysts arising from arterial disease present the characters of these types of cysts.

Solitary large unilocular cysts with serous contents may also be enormous and have been described as larger than a football. They also project as a globular mass from the surface and are smooth except for the occasional presence of adhesions. They are limited superficially by the splenic capsule beneath which they lie and are

TABLE XII.—LARGE, SECONDARY, AND SECONDARY CALCIFIED CYSTS

Reporter	Multiple or solitary	Age	Sex	Mode of origin	Treatment	Result	Remarks	Predisposing disease
Filho	Solitary	23	Female	?	Splenectomy	Recovery		
Becker and Brill	Multiple	36	Male	Trauma	Splenectomy	Recovery		Gaucher's disease
Mayo Clinic (2 cases)	Not stated	41	Male	?	Splenectomy	Recovery	4 cases reported in 800 splenectomies. Details of 2 lacking.	
	Solitary	26	Male	Trauma	Splenectomy	Recovery		Lacerated spleen
Duby, Hyman	Solitary	23	Male	Spl. ven Thrombosis	Splenectomy	Recovery		
McClure and Altemeier	Solitary	11	Male	?	Splenectomy	Recovery		
Mason	Solitary	17	Female		Splenectomy	Recovery	Degenerative hemangioma	
Cabbot	Included in Sweet's report							
Sweet (2 cases)	Solitary	19	Female	? Endothelial	Splenectomy	Recovery	Wt. 38 lbs.	
	Solitary	23	Female	? Endothelial	Splenectomy	Recovery	Wt. 10¼ lbs.	
Deneen (5 cases)	Solitary	42	Female	Undetermined	Splenectomy	Recovery		
	Solitary	12	Female	Trauma	Splenectomy	Recovery		
New York Post Graduate Hospital	Solitary	28	Female	Undetermined	Splenectomy	Recovery		
	Solitary	23	Male	Undetermined	Splenectomy	Recovery		
	Solitary	32	Male	Broken down hematoma	Splenectomy	Recovery		
Ellison	Multiple	36	Male	Spontaneous hemorrhage	Splenectomy	Recovery		Malaria, recent vivax
Dowidar	Solitary	31	Female	Trauma	Splenectomy	Recovery		Wandering spleen. Egyptian splenomegaly
	Solitary	26	Male	Colliquative necrosis	Autopsy	—		Death from purpura hemorrhagica
Moynihan (3 cases)	Solitary	54	—		Autopsy	—		Death from pulmonary tuberculosis
	Solitary	—	—	Tuberculosis	Autopsy	—		Death from pulmonary tuberculosis
Passalacqua	Solitary	17	Female	—	Splenectomy	Recovery		—
Cuff and Gosden	Solitary	50	Female	—	Splenectomy	Recovery		—
Krekeler	Solitary	—	—	Trauma	—	—		Autopsy
Barling and Borrie	Solitary	17	Female	Trauma	Splenectomy	Recovery	—	—
Bostick and Lucia	Solitary	31	Female		Splenectomy	Recovery		
Lahey Clinic (2 cases)	Solitary	18	Male	Trauma	Splenectomy	Recovery		
	Solitary	47	Female	Hemorrhage	Splenectomy	Recovery	Benign cyst	
Aiengar and Naidu	Solitary	N.S.	Female	Trauma	Splenectomy	Recovery		Malaria
Dugan, H. E.	Solitary	24	Male	Trauma	Splenectomy	Recovery	Subcapsular hemorrhage	
Sinnatamby	—	—	—	—	—	—	Wandering spleen	
Williams, Robert	Solitary	25	—	Trauma	Splenectomy	Recovery	Prickle cell gamma-candy nodule	
Strode and Beck	Solitary	34	Female	—	Splenectomy	Recovery		
Kierulf, E.	Solitary	34			Splenectomy	Recovery		
Callahan and Shellito	Solitary	29	Female	Trauma	Splenectomy	Recovery		
Salyer, Sawyer and Forsee	Solitary	24	Female	Trauma	Splenectomy	Recovery		
Stroll and Sarver	Solitary	23	Male		Splenectomy	Recovery	Weight 7 lbs. 12 oz.	

TABLE XII.—LARGE, SECONDARY, AND SECONDARY CALCIFIED CYSTS—(Continued)

Reporter	Multiple or solitary	Age	Sex	Mode of origin	Treatment	Result	Remarks	Predisposing disease
Gatersleben							1st case diagnosed with x-rays	
Schawan		18	Female		Splenectomy	Recovery	History of trauma	
Ostro and Makover								
Scottson		44	Male					
Foldes		49	Male					
Pean		20	Female		Splenectomy	Recovery		
Guido and Vinardi					Autopsy		Effervesced with HCL	
Piccinelli		67	Male		Autopsy			
Mattei		68	Male		Autopsy			
Bauman and Kohnstamm		52						
Bardenheuer								
Terrier		33	Female		Excision of cyst	Recovery		
Andrews and Harter		39	Female		Splenectomy	Recovery		
Zdansky		Adult	Male		Splenectomy	Recovery		
Gallagher and Mossberger		41	Male		Excision pedunculated	Recovery	History of trauma	
Snoke		60	Female		Splenectomy	Recovery		
Neihardt		56	Male		Splenectomy	Recovery	History of trauma	
Witter and Brekke		48	Female		Splenectomy	Recovery	History of trauma	
Donovan		50	Female		Transthoracic splenectomy	Recovery		
Deneen		Details lacking			Autopsy		Bellevue Hospital	
Moynihan		54	Male		Autopsy			
Tamaki		15	Female		Splenectomy	Recovery	History of trauma	
Lahey Clinic	Multiple	72	Female	Not stated	Splenectomy	Recovery	Calcified	
Jayasuriya	Solitary	13	Male	Trauma	Splenectomy	Recovery	Calcified	
Garlock, John H., Applebaum, I. L.; Levine, Burton	Solitary	49	Female	Trauma	Transthoracic splenectomy	Cured	Calcified size of grapefruit	
Houlson, H. M.	Solitary	74	Female	None	Autopsy		Calcified	
Martin, Zega and Adamson	Solitary	66	Female	None	Splenectomy	Recovery	Calcified. Diagnosis with x-rays	
Stahl and Stahl	Solitary	32	Male		Splenectomy	Recovery	Calcified	
	Solitary	76	Female		Splenectomy	Recovery	Calcified	

also partly surrounded by parenchyma. The walls of large old unilocular serous cysts which have been transformed from hematomas show a similar interior to the large hemorrhagic cysts. The interior of the walls of these cysts, also, when smooth never show a definite lining but occasionally there may be round cells or fibroblasts which simulate a patchy lining. In large degeneration cysts trabeculae may form projections. Amyloid changes may be present in intrasplenic blood vessels which may be traced to the wall of the cysts. There is rarely evidence of active hemorrhage except in the case of severe spontaneous bleeding (Ellison). Secondary hemorrhage into the serous variety is not as common as the metamorphosis of the hemorrhagic variety into serous cysts. Secondary small, multiple or single, deep unilocular cysts are discrete, rarely fused, and are entirely surrounded by splenic tissue. This is true of those deep-lying metamorphosed serous cysts originating from spontaneous intraparenchymatous hemorrhage and pulp degeneration by liquefaction. They may also show an organized or unorganized wall, rarely necrosis. They may contain blood. There may be evidence of infarction, endarteritis, or thrombosis at the hilus. Boettcher describes

TABLE XIII.—ALL CASES. TUBERCULOUS CYSTS

Reporter	Primary	Secondary	Sex	Solitary	Multiple	Age	Splenectomy	Result
Peck, C. H.		x		x			Yes	Recovery
Royster		x	Female	x		23	Yes	Recovery
Moynihan		x		x		—	Autopsy	—
Hamilton			—			—	Marsupialization	Survival for 3 mos.

multiple serous, closely packed cysts within the parenchyma from the size of a poppy seed to that of hemp seed. The vessels and connective tissue show amyloid degeneration. The smaller cysts contain serum, fat, and fibrin. The walls are separated by splenic tissue and a fibrinous septum. In places the cavities merge into each other. Small superficial serous cysts, giving the organ a beaded appearance, may be single or multiple. Such cysts occurring in groups and tensely stretched (as described by Ramdhor and Schmidt) are frequently found on the anterior border of the spleen. They do not extend into the parenchyma more that 1 cm. Mueller found these cysts in 11 per cent of his autopsies. Small, surface cysts occasionally show bloody contents. They are usually isolated and unilocular. Ramdhor also described numerous excrescences scattered over the capsule and resembling splenic pulp. These hernial projections were covered with a layer of epithelium. Small surface cysts may coexist with deep cysts and be related or unrelated.

Tuberculous cysts. Primary tuberculosis of the spleen is possible but rare. Winternitz verifies 2 such cases. Pulmonary scars and old adenitis have been found in so many instances that one cannot escape the conclusion that tuberculosis of the spleen is most often secondary to a healed or quiescent focus. The organ is enlarged as a whole. The average weight is between 1,000 and 2,000 grams. The surface may be studded with nodules. There is a caseous center, as a rule, which, if single, may be as large as a grapefruit. This caseous material softens to form cysts. There may be partial healing and encapsulation. The microscopic findings indicate many tubercles with extensive necrosis especially at the site of the malpighian bodies. These are surrounded by round cells and epithelioid cells. There is marked congestion of the splenic pulp. Giant cells are present occasionally. The sinuses are dilated and contain leucocytes and phagocytes. The malpighian bodies are scarce and are replaced by caseous masses. The central artery may still be present. During the reparative process, nodules show yellow centers with central caseation surrounded by epithelioid and round cells. In this stage giant cells are more abundant and the pulp is less congested. In the chronic form the spleen is much enlarged and perisplenitis is present. The organ is firm and indurated with surface swellings from the size of a pea to that of a walnut. On section there are multiple caseous areas of various sizes. In this chronic form nodules become cystic by absorption of the central softened centers. The capsule is thickened. Fibrosis and caseation vie with each other. Microscopically, the cyst contains caseous material and debris. It is surrounded by epithelioid, round, and giant cells and fibrous tissue. The reticulum is thickened and contains dense bands of fibrous tissue. There is advanced sclerosis. The malpighian bodies disappear entirely. Infarcts occur from extensive hemorrhage. Royster, of Raleigh, North Carolina, reported 3 cases of splenic cysts in 1911, one of which was a tuberculous cyst. Splenectomy led to recovery. The gross specimen examined by Henry G. Turner revealed a spleen nearly normal in size, but honeycombed with multiple areas containing the same material as that evacuated from the cyst. Cheesy masses were deposited in and around these small cavities. The microscope confirmed the clinical opinion of tuberculosis. Hamilton reported a tuberculous cyst of the spleen in 1896. Details available are that his patient lived 3 months after marsupialization. The contents of the cyst were broken-down tuberculous material.

SYMPTOMS

The onset of cysts may be acute without warning. Intermittent or continuous extravasation of blood is not usually sufficient to cause symptoms of internal hemorrhage. Some cases have shown this feature from spontaneous rupture, as in the case of a hemangioma (Haines and McIlroy) and in intrasplenic hemorrhage occurring in a malarial spleen (Ellison). When cysts are small there are no symptoms. Large cysts cause symptoms from pressure on the neighboring organs with resulting dysfunction. Symptoms may simulate almost any abdominal or chest lesion from pressure when a large cyst is present. Pressure upward on the diaphragm may cause symptoms of pleurisy and

dyspnea, cardiac palpitation, displacement of the heart, or symptoms referable to the kidney or bladder. Pelvic symptoms may arise; circulatory disturbances may occur in the limbs. Cases have been observed without significant symptoms during life (Goldberg) or found incidentally in the course of operations for conditions which masked the symptoms of the splenic cyst, as in the course of an operation for gallbladder disease (Sprague) in which a splenic cyst was previously unsuspected. An acute condition of the abdomen with cramps and distention may simulate perforated peptic ulcer. Cysts have also been found without symptoms in the course of routine physical examination. Low grade inflammation causes adhesions which in turn cause symptoms. Peritoneal reaction may excite pain, vomiting, and fever. In not a few cases acute symptoms brought the patient to the physician. The chief symptoms are pain and swelling beneath the left lower ribs. The pain varies and may express itself as a feeling of heaviness or of a dragging character. It is located in the left hypochondrium or referred to the epigastrium, at times to the left shoulder blade. It may be vague, show a relationship to other abdominal organs; or it may be aching or acute. If the spleen is dislocated or wanders, pain may be experienced in any part of the abdomen and radiate. Digestive disturbances, especially indigestion, have been frequently observed because the stomach and intestines suffer by being crowded downward and to the right. Obstinate constipation has been noted and, more rarely, diarrhea. Frequently the patient has first observed the presence of abdominal swelling which gradually increased in size without pain. Growth is usually slow. In other cases mild repeated attacks of pain or dyspepsia have been the rule or a long latent period has resulted in a sudden outbreak. Occasionally, symptoms of collapse have occurred from a twisted pedicle. Loss of weight and strength have not been observed until the growth is large. It was noted by Moynihan that splenic cysts, especially those of the ecchinococcal variety, may adhere to the stomach, rupture into it or into the colon, and cause acute symptoms attended with vomiting and spurious diarrhea. When a painless growth occurs the cyst may be mistaken for pregnancy. Lang, Morton, and their associates report a recent case of cyst which ruptured into the left pleural cavity and simulated an effusion; the cyst was drained by thoracotomy and splenectomy was done by the transthoracic route. Schottenfeld and Wolfson have analyzed the incidence of symptoms and objective findings in 16 cases of hemangioma; their report is condensed in Table IV.

The chronic form of splenic tuberculosis forming cysts is more frequent than the acute. In the chronic form the onset is insidious with indefinite pain and a sense of weight in the left hypochondrium. This is associated with tumor in the left upper abdomen. Gastric symptoms may predominate as in other splenic enlargements. There may be loss of weight and appetite, and pressure symptoms noted in other splenic cysts for a period of 1 year or more. Fever may or may not be present. After years of enfeebled resistance, generalized tuberculosis may ensue.

DIAGNOSIS

On examination one finds that the tumor is located in the left hypochondrium and may extend from the lower border of the ribs to the midline and below the navel. Percussion reveals a mass corresponding to the splenic dullness. The mass may be fixed or freely movable as in a wandering spleen with cyst (Dowidar). Its surface may be smooth, irregular, and of doughy or of elastic consistency. Fluctuation may not be present. There may be a friction sound which results from perisplenitis. There is no ascites. The preoperative diagnosis of splenic cyst has been made infrequently in the past, but is now made with greater accuracy. Cysts of the spleen must be differentiated from those of the omentum, pancreas, mesentery, and left lobe of the liver. If a cystic spleen is displaced into the pelvis, it may be mistaken for an ovarian cyst, pregnancy, or a floating kidney. A more refined diagnosis than abdominal cyst or splenic enlargement is now possible with improved x-ray methods. The clinical differential between cystic and solid tumors by palpation alone may not be easy because of tense distention of a cyst. The finding of an enlarged spleen poses the elimination of solid tumors. Splenomegaly due to malaria, syphilis, the leucemias, Hodgkin's disease, Banti's disease, Gaucher's disease, the anemias, and other primary and secondary lesions must be ruled out. Biopsy of the superficial nodes and bone marrow, and laboratory aids such as liver function tests and blood examinations are helpful. Having determined the presence of a cyst it remains to rule out the ecchinococcal variety. This may be done by applying the cutaneous allergy test of Cassoni, the complement fixation test of Weinberg, and the precipitin test of Welch and Chapman. The parasitic cyst usually springs from the upper pole. When thus located the lower pole of the spleen assumes a characteristic feel—it is usually elongated and pointed. The notch may occasionally be felt.

Roentgenography offers the most accurate aid in the detection of large cysts, especially for the study of extrinsic gastrointestinal diseases. Tumors of the left upper quadrant may have their origin in any one of the following: spleen, left kidney, splenic flexure, stomach, left lobe of the liver, tail of the pancreas, and retroperitoneal soft tissues. Barium studies of the gastrointestinal tract are of great value in the differential diagnosis. Splenic enlargement characteristically causes a smooth indentation anteriorly on the greater curvature of the stomach in the region of the cardia and media and, as the enlargement becomes more marked, the stomach is displaced downward, to the right, and forward. Tumors of the left kidney must be very large in order to cause deformity of the gastrointestinal tract. The enlargement in lesions of the left kidney is posterior to the stomach, so that the deformity is in the nature of a compression from behind and the stomach is displaced toward the midline; the transverse colon is displaced downward, and the splenic flexure may be pushed to the left and compressed against the lateral abdominal wall. Tumors of the left lobe of the liver may displace the stomach and the splenic flexure downward, to the left, and forward, according to the degree and type of enlargement. Rapidly growing malignancies of the left lobe of the liver produce, in addition to extrinsic pressure, selective barium residue at the lesser curvature of the stomach in gastric motility studies. This is due to adhesions of the omentum to the left lobe of the liver as shown by Pomeranz. In cases of leucemia with enlargement of both the liver and spleen, the stomach is compressed from both sides by the liver and spleen. Retroperitoneal tumors, neuroblastomas, or sarcomas will produce extrinsic pressure upon the greater curvature of the stomach from behind, which must be differentiated from splenic enlargement. This differential diagnosis can be made by means of peritoneography or pneumoperitoneum (Pomeranz). Tumors of the tail and body of the pancreas usually cause deformities of the greater curvature and lower portion of the stomach. The defect in this instance is usually rounded and smooth in outline and changes as the position of the patient is changed. The posterior gastric wall may be forced anteriorly and the tumor may extend into the lesser peritoneal sac, causing a flattening of the lesser curvature of the stomach. The distal third of the transverse colon also may be displaced downward and to the left. In the case of intrinsic tumors of the stomach and the splenic flexure, studies of the stomach and colon with the aid of barium serve to establish the diagnosis. Roentgenoscopy combined with palpation is extremely important to determine mobility and the presence or absence of adhesions to other organs and also to indicate whether or not the mass moves with respiration. Calcified areas in splenic cysts and increased density of solid tumors in the splenic region are readily identified on the plain film. If the film is taken in conjunction with a pyelogram, as in Schawan's case, the result is illuminating. A picture similar to that of calcified cyst is noted on the plain film in calcified aneurysm of the splenic artery. The location is the same and the roentgenogram is much the same unless the entire cyst wall shows oval or circular shadows with definite outlines. A bruit is a distinguishing clinical feature. Pulsation may or may not be present in an aneurysm. It has been noted by Ostro and Makover in splenic enlargement due to myeloid leucemia that elevation of the diaphragm, spreading of the ribs, and obliteration of the psoas shadow did not occur, which indicates to them that if splenic growth is downward and forward these pressure effects may be absent. Results of roentgenography with pneumoperitoneum as done by Pavlovsky would not appear to be warranted. Massei called attention to the possibility of rupture of ecchinococcus cysts into the peritoneal cavity following this procedure. Visualization of the reticuloendothelial system of the spleen has been accomplished by means of thorotrast for demonstration of splenic disease. This procedure was abandoned because of late radioactivity of the thorium compounds. There is at present no other nontoxic material available for this procedure. Iodine, however, may be used for visualization of the arterial tree of the spleen or for visualization of the peritoneum. Further studies must be made to evaluate these opaque substances for the determination of splenic disease. The general density of the spleen on a plain film is much less than that of the liver and is frequently not delineated at all. The spleen is occasionally markedly radiopaque because of congestion, as in venous thrombosis. Bachman makes the following x-ray differentiation: in ecchinococcal cysts mural calcifications occur only as plaques or sheetlike depositions. The former vary in number and density. Moynihan holds that calcification occurs late more frequently in small cysts which are dormant. The spleen is enlarged. There is a characteristic single, large, rounded calcified ring or two closely parallel rings. There is great variation in the completeness of the calcified contour. The calcification may form a small arc, be missing entirely, or, rarely, may occupy the entire circle. Within the circumference

may be seen a number of irregular, ill-defined concretions. It is typical of calcified ecchinococcal cysts that their density is not great. Bachman differentiates calcified nonparasitic cysts by means of x-rays. He believes that calcified walls are extremely rare. The calcification usually occupies the entire circumference of the cyst, without break, and is a heavy deposition, more uniform and more dense than ecchinococcal cyst calcification, without shadows or concretions within the circumference. The x-ray appearance of a calcified nonparasitic cyst may be simulated by a calcified aneurysm of an intrasplenic artery. This type of cyst is rare and differentiation may be impossible. It is noted that calcifications have occurred in primary epidermoid cysts.

When all the clinical and laboratory evidence is assembled and correlated with the roentgenologic findings, the diagnosis of large splenic cyst is simple. The left side of the diaphragm is high and, under the fluoroscope, its motion is impaired. A plain abdominal film often shows a large, soft tissue mass arising in the left upper quadrant. Hampton has called attention to the fact that the lower pole of this shadow in cases of splenic cyst may have a somewhat pointed contour which extends downward and to the right into the pelvis. This observation is based on the appearance of the shadow cast by the tumors in the 3 cases reported by Sweet and depends on the fact that in all of these cases the cyst developed in the upper pole of the spleen, leaving a small intact, triangular lower pole at the lower extremity of the tumor. It must be recalled that parasitic cysts give this same appearance when situated in the upper pole. If the cyst should develop in the lower pole, this shadow would not occur. Splenomegaly does not usually displace the left colon. It should be borne in mind that the stomach does not always show the classical displacement on the x-ray film and that certain atypical aspects of high compression of this viscus may be present in some splenic cysts. Displaced viscera after splenectomy resume their normal positions. The roentgenogram may be misleading or misinterpreted in a large cyst and disclose a tortuous left ureter with marked dilatation of the kidney pelvis, as in the case of Montgomery, Frank, and McEnery who first diagnosed hydronephrosis. A refined preoperative pathological diagnosis of various types of cysts will probably not be made but may be suspected. It is stressed that the postoperative diagnosis of epidermoids and other cysts may require the cutting of many sections; it may be difficult, and may be achieved only after the exercising of much patience.

In the chronic form of tuberculous cyst, one may obtain an acute past history, as follows: the presence of tuberculosis elsewhere, an enlarged spleen and liver, tenderness or pain in the left hypochondrium, characteristic septic or remittent fever, polycythemia, cyanosis, and a tuberculin reaction. The absence of leucemic blood is helpful. The blood picture, however, is not constant. The red blood count and the white blood count may be normal, increased, or decreased. Progressive leucopenia may be present. The Calmette tuberculin reaction should be observed; however, it is not conclusive.

TREATMENT

Cysts of the spleen have been treated surgically by (1) puncture, (2) incision and drainage, (3) excision, and (4) splenectomy. The less radical procedures were undertaken at a time when splenectomy was considered a grave operation and before it was known that removal of the organ was not followed by serious impairment of the general health. Splenectomy is the treatment of choice in all cases in which the operation is not contraindicated by the presence of extensive adhesions. If there is polycystic degeneration, if the spleen is otherwise extensively affected by pre-existing disease, if the spleen is materially enlarged as a result of the cyst, if there is displacement, or if there is elongation of the pedicle with danger of torsion excision of the spleen is the best treatment. A transthoracic splenectomy was done in 1 case (Lang, Morton, Steele and Schaeffer) with recovery. Montgomery, McEnery, and Frank reported a case in a 6 month female drained retroperitoneally on the mistaken diagnosis of hydronephrosis. Unfortunately, the fluid was not examined. Six weeks later nephrectomy and splenectomy were done with fatal result. Under rare conditions the cyst may lend itself to excision, as in the case of the pedunculated cyst reported by Gallagher and Mossberger. One cyst was excised, 1 was marsupialized, and there was one partial splenectomy; all 3 cases were without mortality. Figures are available for 110 splenectomized primary and secondary cysts. The over-all mortality was 4 per cent. Sixty-three primary cases showed 8 per cent mortality and of these, 26 splenectomized hemangiomas showed 18 per cent mortality. Epidermoids showed a 6 per cent mortality in 17 cases. Lymphangiomas and endothelial cysts showed no mortality in 10 cases of each. There was no mortality in 47 secondary cysts.

Splenectomy is indicated in tuberculous cysts whether acute or chronic, even in the presence of liver involvement. Removal of the spleen may

permit the patient to combat the infection elsewhere successfully for it removes a focus which constantly feeds tubercle bacilli to the liver through the portal circulation. Adhesions are prone to occur in the chronic form. Mortality from splenectomy of the tuberculous spleen is estimated by Winternitz as 41 per cent in 17 cases.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Eosinophilic Granuloma of the Skull. G. A. BYNUM. *Am. Surgeon*, 1952, 18: 793.

The author presents 6 cases of eosinophilic granuloma of the skull. Four of the patients were children and the remaining 2, adults. Treatment was surgical with or without roentgen therapy. In 1 patient a recurrence developed. One patient followed for 5 years, and another followed for 9 years are free of recurrence. All patients made good immediate recoveries.

Eosinophilic granuloma appears to be a benign lesion of bone occurring mainly in children and young adults. Its exact etiology is not known. Most authors agree that it is inflammatory in origin. The sex incidence is equal.

The bone lesions are usually solitary but may be multiple and involve the skull, pelvis, long bones, vertebrae, and ribs. Local manifestations occur in the form of pain, local swelling in the soft tissues, and tenderness. Fever, general malaise, and weight loss may be present. There is usually a leucocytosis and an eosinophilia of varying degree.

Individual bone lesions appear as sharplv demarcated, punched-out areas of radiolucence. Their gross appearance is that of a soft, friable, hemorrhagic and cystic, yellowish brown to reddish material. Microscopic examination reveals a destructive granulomatous lesion characterized by large sheets of phagocytic histiocytes mixed with numerous eosinophilic leucocytes and reactive multinucleated giant cells. The diagnosis of the disease is made by histologic section.

Surgical excision is the treatment of choice in solitary lesions. Roentgentherapy may be used in addition, and is the treatment of choice for multiple lesions. In general, the prognosis is excellent, but should be considered guardedly in the young patient with multiple lesions. DONALD C. GEIST, M.D.

Consideration of 180 Cases of Typical Fractures of the Mandibular Condylar Process. W. D. MACLENNAN. *Brit. J. Plast. Surg.*, 1952, 5: 122.

One hundred and eighty cases of mandibular condylar process fractures are discussed. Males suffer this injury 8 times more frequently than females, and trauma from fighting or from an accident is the most common cause. Most fractures occur low on the condyle, but when the fracture is nearer the head there is often an accompanying dislocation. Injuries of this type in children under 5 produce marked deformities in adult life because of disturbance of the growth center.

When first seen, the most common findings are pain and swelling just below the zygomatic arch and just anterior to the ear, limitation of mandibular movement, displacement of the mandible to the injured side, malocclusion, and masseteric spasm.

Contrary to previous opinions, the author believes that osseous union is a frequent result. Complete immobilization for 14 days, and controlled, limited motion for another 14 days are utilized. This is more important than proper alignment of the fractured fragments. Condylectomy may be necessary on rare occasions to correct a malalignment. Pin fixation and transosseous wiring seem to be no better than intraoral fixation.

Results in this series have been excellent, although radiographic deformity is a common sequel. Post-reduction limitation of movement was never seen; pain was present in only 2 patients in the series. Other complications are conspicuous by their absence. HAROLD M. UNGER, M.D.

Ankylosis of the Temporomandibular Joint. FENTON BRAITHWAITE and FREDERICK HOPPER. *Brit. J. Plast. Surg.*, 1952, 5: 105.

Interference with normal temporomandibular function may lead to (1) limitation of mandibular growth resulting in a "bird-face" deformity, (2) limitation in eating and talking, (3) serious dental problems, and (4) psychological disturbances based on these deformities.

A brief historical sketch indicates that operation for this deformity has been practiced since 1826 when Barton, of Philadelphia, conceived the idea of creating a pseudarthrosis to overcome the ankylosis. Treatment has since been directed towards condylectomy with the interposition of foreign material or autogenous tissues in order to prevent re-ankylosis. The majority of cases have an unknown etiology but some may be traced to trauma, either at birth or later in life. Infections or arthritis are the cause in some of the cases.

The operative procedure devised by the authors is clearly described in detail. It consists of inserting a wedge of ox cartilage into a space created by completely transecting the ramus of the mandible between the mandibular foramen and the sigmoid notch. This prevents re-fusion, and a pseudarthrosis is created. Facial or mandibular nerve injuries should not occur. Wedging the mouth open for 10 to 15 days is important. Dental hygiene can be started soon after the operation, but extraction and prosthetics should be started about 1 year after surgery in order to avoid infections and to permit the mouth to adjust to the new status.

The results of the procedure have apparently been good. A few representative cases are presented. They illustrate the fact that this operation is most successful when there has been no previous orthopedic work for fractures, or ankylosis. No statistical survey is presented. HAROLD M. UNGER, M.D.

Benign and Malignant Tumors of the Jaws. JOHN B. ERICH. *Surg. Clin. N. America*, 1952, 32: 1159.

This article presents, with excellent roentgenograms and illustrations, the author's classification of benign and malignant tumors of the jaws.

In Group 1 are the tumors of both categories, which arise from the soft tissue adjacent to the jaw bones. Since these are all easily palpated and seen, their diagnosis and treatment is not particularly difficult. The benign representatives of this group are torus palatinus, epulis, hemangioma, and hypertrophic gingivitis; the malignant ones are epithelioma, sarcoma, and adenocarcinoma of the palate.

Group 2 contains the cystic tumors which arise within the bones of the jaw, only one of which—the adamantinoma—is malignant. The others of this group are: root-end cyst, follicular cyst (simple follicular cysts, follicular cyst with an odontoma, and dentigerous follicular cyst), and hemorrhagic cyst. In the diagnosis of tumors of this group, it is significant that an exploratory operation will be required in most instances but that delay in treatment for a few weeks to months will not jeopardize the patient and is, in fact, advisable, as it permits determination of whether or not the cyst is enlarging.

Group 3 consists of those tumors which originate within the bone, and sometimes grow to large proportions, producing a defect that is filled with some abnormal tissue and that has demonstrable roentgenologic characteristics. Numbered in this group are fibroma, angioma, giant cell tumor, solid odontoma, localized osteitis fibrosa cystica, solid osteoma, spongy osteoma, fibro-osteoma, myxochondroma, chondro-osteoma, and some osteogenic sarcomas. Here again a definite diagnosis must usually wait on exploratory operation and microscopic examination of removed tissue.

In Group 4 are tumors of malignant character which produce a motheaten appearance on roentgenologic examination of the jaw bones, primary malignancies, and secondary ones.

Many practical points of diagnosis and therapy are discussed, particularly with reference to the generously interspersed illustrative material.

BENJAMIN F. LOUNSBURY, M.D.

EYE

Symposium: Ocular Injuries. BRENDAN D. LEAHEY, RALPH S. MCLAUGHLIN, EDMUND B. SPAETH, and HAROLD G. SCHEIE. *Am. J. Ophth.*, 1952, 35: 1077.

Leahey notes that severe burns of the upper face are usually accompanied by ectropion of the eyelids. The first treatment should consist of gentle cleansing without débridement. In extensive burns the granulating area should be covered, in about 3 weeks, with a split-thickness skin graft. A small third degree burn may be excised immediately and replaced with a full thickness graft. Symblepharon is most effectively prevented by an immediate mucous membrane graft. Topical cortisone is of value in burns of the cornea. Beta-irradiation should be used early on vascularizing leucomas.

First aid treatment of chemical burns, as stressed by McLaughlin, is copious flushing with tap water for 5 minutes. After this, any gross particles present are removed and irrigation with isotonic saline is continued for another 15 to 30 minutes. The injured eye is again tested with fluorescein and the cells affected by the chemical are removed by a small sterile swab; the cornea is wiped with a circular motion from the center to the limbus; the conjunctiva is wiped meticulously throughout. In extensive ulcers, cortisone ointment is used to prevent vascularization, and choline chloride (1%) is prescribed for residual opacity.

Spaeth discusses secondary repair. Ectropion is corrected by resection of scars and the use of free skin grafts; entropion requires always a mucous membrane graft. Functionally lost globes should be enucleated. If the socket cannot hold a prosthesis satisfactorily, mucous membrane grafts are implanted. Central corneal scars are usually best treated with nonpenetrating keratoplasty.

Scheie urges early repair of lid lacerations to prevent deformity, and discusses iris prolapse, traumatic cataract, and wounds over the ciliary body. In deformities of the medial wall of the orbit, Converse and Smith perform dacryocystorhinostomy, restore the bony contour, and reattach the medial canthal ligament. The most common effects of contusion, according to Hogan, are sphincter or radial tears of the iris, iridodialysis, lacerations of the ciliary body with hemorrhage, subluxation or dislocation of the lens, retinal edema, and choroidal tears. Recurrent hemorrhage is the great danger causing disastrous secondary glaucoma or retinal detachment, blood staining of the cornea, or membrane formation in the pupillary area. Prophylactically, bed rest, cycloplegics, and bandage are usually indicated. JAMES E. LEBENSOHN, M.D.

The Surgical Treatment of Malignant Exophthalmos. WINCHELL MCK. CRAIG, M.D., and HENRY W. DODGE, JR. *Surg. Clin. N. America*, 1952, 32: 991.

About one-third of patients with primary hyperthyroidism manifest exophthalmos, but only one per thousand exhibits malignant exophthalmopathy. The usual interval between subtotal thyroidectomy and progressive exophthalmos is 6 weeks to 1 year. The early ocular complaints are a tearing, gritty sensation, ocular pain, pressure behind the eyes, blurring vision, and sometimes diplopia. During the acute progression, which may last from 6 weeks to 6 months, increasing proptosis is noted, with bulbar congestion, chemosis, edema of the lids, muscle palsies, limited gaze, and possibly keratopathy.

The Hertel exophthalmometer and the more accurate orbitometer show that most malignant protrusions occur in the range of 25 to 35 mm. Conservative treatment should be attempted first, as the majority tend to spontaneous remission. Therapy may include regulation of fluid balance, diuretics, lumbar puncture, thyroid therapy or radioiodine and x-ray treatments to the orbits or pituitary, or both.

The Naffziger operation is imperative when vision is threatened by exposure keratitis, papilledema, or defects of the visual field. The patient is prepared with a prophylactic daily dose of 600,000 units of penicillin. A bilateral two-point tarsorrhaphy is done followed by a bifrontal extradural craniotomy. After the bone flap has been raised, 40 to 45 c.c. of spinal fluid are temporarily removed. The orbits are unroofed, the sphenoid wing and posterior lateral orbital wall removed, and a stellate incision of the periorbita is made, care being taken to avoid the annulus of Zinn. Cigarette drains, to be removed in 24 hours, are placed between the dura and orbital contents on each side. The spinal fluid is reintroduced and isotonic saline given intravenously. The patient is placed on a right or left face-down position alternately to facilitate the refilling of the dead space by the brain. The scalp sutures are removed on the ninth day, the lid sutures about that time, and the patient is discharged from hospital care 2 days later.

The authors have done this operation in 28 cases since 1934, with one mortality and the loss of one eye. Intervention should be relatively early.

JAMES E. LEBENSOHN, M.D.

Hexamethonium and Glaucoma. A. J. CAMERON and R. A. BURN. *Brit. J. Ophth.*, 1952, 36: 482.

A study was made of the effect of hexamethonium on the intraocular tension of 17 patients with known glaucoma. The medication was used in increasing doses intravenously, and blood pressure and tension were taken periodically.

In no case was a rise in intraocular tension noted. The general and consistent change was a slight fall.

EARL H. MERZ, M.D.

Ocular Periarteritis Nodosa. GEORGE N. WISE. *Arch. Ophth.*, Chic., 1952, 48: 1.

Periarteritis nodosa is a condition primarily affecting medium and small arteries, and for this reason it may simulate any number of other disease entities. The etiologic agent is unknown but the strongest evidence suggests that it is a syndrome due to hypersensitivity of the arterial wall to various antigens. The disease is more frequent in males, is of slow or rapid onset, and is most apt to occur in the middle decades of life.

A number of ocular signs have been reported, with the more common involvement being angiospastic retinopathy or involvement of the uveal arteries. Rarely involved are the arteries of extrinsic eye muscles, the retinal arteries, and the sclera.

Two cases are reported. Each of these patients first sought care because of a corneal ulcer. The first case presented a picture of progressive corneal ulceration, progressive rhinitis, loss of weight, septic fever, skin nodules, weakness, myalgia, hepatomegaly, splenomegaly, eosinophilia, anemia, and x-ray shadows in the right and left lungs not unlike those of tuberculosis. Biopsy did not show vascular lesions. After 7 months of observation, the patient died of intestinal perforation and peritonitis. Practically all tissues were involved in arterial and venous thrombosis in all stages of organization. Certain sections showed vascular lesions typical of periarteritis nodosa; these lesions were often masked by more prominent hemorrhage and necrosis.

In the second patient, a female aged 65, the diagnosis of periarteritis nodosa was suggested by the similarity of the clinical picture to that of the first case. In both cases lesions were present in the fundi but were poorly visualized because of the corneal ulceration. The choroid is by far the most frequently involved eye tissue.

FRANK W. NEWELL, M.D.

Lamellar Corneal Grafts. Clinical Report on 62 Cases. B. W. RYCROFT and G. J. ROMANES. *Brit. J. Ophth.*, 1952, 36: 337.

Lamellar keratoplasty has many advantages of safety over penetration keratoplasty, but 30 to 40 per cent of cases in which defective vision is due to a corneal lesion require the latter procedure, or a combination of both.

Sixty cases are reported. Among 41 cases in which optical grafts were used, vision was improved in 24. The best results were in those which improved from perception of light to 6/9; no change was seen in 11 cases; there was deterioration in 4 cases; and the change was not assessed in 2 cases. No eyes were lost, and in some of the eyes which were not improved a further graft, either of lamellar or penetration type, will improve vision.

A major problem is that of tissue allergy. In this series, 10 cases showed severe vascularity which could be ascribed to antigen reaction between donor graft and host cornea.

Influencing the success of lamellar keratoplasty are the correct selection of cases, perfect instruments, mature technique, and adequate after care, together with the use of excellent donor material.

Cortisone instillations relieve early corneal neovascularization and discomfort, and may also prevent the more serious late vascularization.

FRANK W. NEWELL, M.D.

Observations on the Choroidal Circulation. NORMAN ASHTON. *Brit. J. Ophth.*, 1952, 36: 465.

The study of aqueous veins and subsequent studies of their significance has stimulated new research in glaucoma.

The author discusses the minute anatomy of choroidal circulation which, he believes, is extremely important. Neoprene latex was used to make casts of choroidal circulation, and the study was broken down into: (1) arteriovenous anastomoses, (2) glomus apparatus, and (3) choroidal circulation.

The conclusions arrived at were that in the presence of pathologic conditions, arteriovenous anastomoses may develop in the choroidal circulation. The function is not known but may be cause for a rise in tension. Glomus cells and arteriovenous anastomoses in normal choroid were not present.

EARL H. MERZ, M.D.

Vitreous Cyst with Retinitis Pigmentosa. A New Syndrome? J. W. WAGENAAR. *Brit. J. Ophth.* 1952, 36: 492.

The author presents a case of congenital pedunculated cyst of the vitreous with unilateral retinitis pigmentosa.

In reviewing the literature, the author found reports of 2 cases almost identical to the one presented by himself. In conclusion, he states that the occurrence of this condition is not a coincidence, but a new syndrome, the clinical picture of which is known, but the etiology and treatment is not known.

EARL H. MERZ, M.D.

Survival of Retinal Elements in Subcutaneous Homografts. GEORGE M. WYBURN and PAUL BACSICH. *Brit. J. Ophth.*, 1952, 36: 438.

Homografts of the anterior part of the eye of the guinea pig were transplanted into the subcutaneous tissue of another guinea pig. Three and 4 weeks later the grafts were removed, sectioned, and stained for histologic study. Retinal elements were found in 4 homografts. The appearance resembled the peripheral region of the normal guinea pig retina. Ganglion cells and bipolar cells were present but rods and cones could not be demonstrated. Rod and cone elements were replaced by a single row of low columnar cells. Cyst formation, which is common with other subcutaneous grafts, also occurred. These areas of proliferating cells were not only present in the midst of retinal elements, but occurred also as characteristic isolated entities. They included optic fibers, ganglion cells, and what probably corresponds to the inner plexiform layer. In the center of these "retinomata" were dense clusters of cells in the position of the bipolar cells, showing active proliferation. Areas of exuberantly proliferating pigmented epithelial cells were present and appeared to possess a vigorous vitality surpassing that of neighboring tissue.

FRANK W. NEWELL, M.D.

Uses and Limitations of ACTH and Cortisone in Ophthalmology. ALAN C. WOODS. *Brit. J. Ophth.*, 1952, 36: 401.

ACTH and cortisone have a definite but limited rôle in ophthalmic therapeutics. The favorable action is limited to the control of inflammation and exudation. They have no antibiotic or chemotherapeutic effect, and act not on the cause of disease but on the reaction of the tissues to a cause or irritant. When ocular inflammation is the result of acute trauma, either allergic, toxic, or physical, the reaction of the tissues is usually self-limiting and the control of inflammation over the natural life of the tissue reaction may simulate a complete cure. These hormones, therefore, find their highest usefulness in allergic reactions of the external eye and nongranulomatous inflammations of the uveal tract.

In chronic granulomatous uveitis, the effect of these hormones is not so spectacular. Recurrences after cessation of treatment are frequent. When employed to suppress the inflammatory reaction due to chronic infection of the tissues, their use should always be accompanied by specific antibiotic or chemotherapeutic procedures to eliminate the basic underlying infection. They have no effect in the usual degenerative diseases of the eye. There is a possibility, however, that they may be effective in ocular disease related to fibrinoid degeneration.

The use of cortisone, and probably of ACTH, is usually contraindicated in any form of ocular tuberculosis; the hormones should be used with great caution in chronic granulomatous infections. In disease of the external eye and anterior ocular segment, the treatment of choice is the topical use of cortisone, either as an ointment or as a collyrium. In disease of the posterior ocular segment, parenteral ACTH or cortisone is preferable. In severe resistant cases, intravenous ACTH may be indicated.

Experimental studies in which various ocular reactions were used as the indices have shown that: (1) topical or parenteral cortisone and parenteral ACTH will suppress various recognized ocular hypersensitivity reactions, ocular reactions due to irritants, and inflammation due to infection, inhibit neovascularization of the cornea, reduce fibroplastic activity in the stroma of the cornea and regeneration of the corneal endothelium; and (2) cortisone and compound F will radically alter the pathogenesis of ocular tuberculosis, changing the picture in the immune-allergic rabbit from a restrained fibrotic process into a necrotizing caseating destructive lesion.

The mechanism of the therapeutic action of ACTH and cortisone in ocular disease is as yet undetermined. The present indications are that it is due to a direct action of the adrenocortical hormones on the mesenchymal fraction of the inflamed eye.

FRANK W. NEWELL, M.D.

MOUTH

The Premaxilla in Bilateral Clefts of Lip and Palate. D. N. MATTHEWS. *Brit. J. Plast. Surg.*, 1952, 5: 77.

The author discusses the problems of repair of bilateral clefts of the lip and palate. The anatomy of the premaxilla is discussed, as well as the deformity which its maldevelopment creates in this congenital defect.

The anterior displacement and rotation of the premaxilla are such that the problem must be met either by freeing the lateral elements sufficiently to draw them forward to meet it, or by setting the premaxilla back to meet them.

Following the views of Denis Browne, the author believes that premaxillary reposition is a satisfactory

procedure and that it may be used in more severe cases. The repair is described and illustrated. It consists essentially in setting back the premaxilla and fixing it to the septum by transfixion with a specially designed pin. At this first operation, one side of the lip and nostril are also closed. Three weeks later the second side is closed in the same way and the pin is withdrawn. The surgical technique is described and illustrated in detail. In very severe cases, elevation of the nasal tip becomes necessary. This is done at 3 years of age by further plastic procedure, as described.

This method has been used by the author in 20 cases, with satisfactory results. In 1 case it resulted in retardation of growth of the premaxilla with a tight lip. Two patients required orthodontic care because of poor occlusion. Secondary elevation of the nasal tip was performed in 7 cases and may be necessary in 3 others. DONALD C. GEIST, M.D.

NECK

Recent Advances in Our Knowledge of the Thyroid Gland. PETER HEINBECKER. *Ann. Surg.*, 1952, 136: 145.

Recent advances in the knowledge of the thyroid gland include the purification of the thyroid hormone. The mechanism and the site of synthesis of this hormone is not established fully. Its physiologic action is well known and has been frequently described.

The relation of the thyroid to other endocrine glands is still under investigation. It has been well established that the pituitary gland secretes a thyrotropic hormone. The source of this thyrotropic hormone is attributed by many investigators to the basophile cells of the hypophysis, and the author presents experimental evidence which supports these views.

Studies made by this author suggest that the pathogenesis of hyperthyroidism is associated with nervous influences, especially those which increase the activity of the hypothalamic nuclei—particularly the paired paraventricular nuclei.

A thyroid-adrenal interrelationship has long been known, and the occurrence of adrenal atrophy with Graves' disease is well known. It is believed that hyperthyroidism results in adrenal cortical depression because of its interference with neural mechanisms which suppress the hypothalamic-hypophysial system, a condition necessary for the neurogenic release of ACTH.

Functional interrelationship between the thyroid and parathyroid glands has not been proved. Enlargement of the parathyroid glands has been noted experimentally when the neural hypophysis has been denervated. Hyperthyroidism with exophthalmos has been noted to occur following the removal of an actively secreting parathyroid adenoma.

The isolation of a thyroid-stimulating hormone from the glandular hypophysis has been investigated. It has not been separated completely from the gonadotropic and adrenotropic factors. Little is known of its structure beyond the establishment of its protein nature.

The pathogenesis of exophthalmos has been under investigation for a long time. Present belief is that it is caused by an increase in the volume of the retrobulbar tissues. This results from edema of the retrobulbar fat and of the extraocular muscles. Fatty infiltration develops together with an increase in lymphoid tissue and phagocytic cells in the edematous fat and muscle tissues.

The adequate use of iodine in eradicating endemic goiter is well understood, and studies have been conducted on the effects of iodine in clinical hyperthyroidism and in association with antithyroid drugs.

Recent investigations have been concerned with the uses and effects of goitrogenic drugs; their use in the treatment of hyperthyroidism has been the subject of much discussion, and the same is true of radioactive iodine. The efficacy of radioactive iodine in the therapy of hyperthyroidism has been demonstrated, and it is believed that a large percentage of thyroid patients can be successfully treated with this substance.

Investigators have recently demonstrated the association of malignancy with the nodular goiter, especially the single-nodule type.

Surgery of the thyroid gland still maintains a wider coverage than other forms of therapy. Its importance in making an anatomic diagnosis is especially noted. The effectiveness of iodine and thiouracil in lessening complications and as an aid to surgery is well demonstrated. Surgeons, however, must recognize that other forms of therapy now have much to offer the thyroid patient.

DONALD C. GEIST, M.D.

Hypophyseal Thyrotropin in the Pathogenesis of Hyperthyroidism (La tireotropina ipofisaria nella patogenesi dell'ipertiroidismo). L. GALLONE, W. GALLUZZI, G. GARIBOLDI. *Chirurgia*, 1952, 6: 441.

The authors review the literature concerning the problem of hypophyseal alterations in hyperthyroidism. They then studied the thyrotropin activity in normal individuals and in patients with hyperthyroidism under various forms of treatment.

Thyrotropin activity was measured according to the method of Purves and Griesbach. In this method, serum is injected subcutaneously in guinea pigs. Twenty-four hours after injection, a thyroidectomy is performed on the animals and the cytometric observation of the thyroid cells is recorded. The mean value for 100 cells measured is the index of thyrotropin response. In normal patients the mean cytometric value was 2.0. In 8 hyperthyroid patients, with a basal metabolism rate (B.M.R.) of +25 to +100, the cytometric value was 2.1. There was no correlation within this group as to the B.M.R. or the presence of exophthalmos. This same group of patients were tested as to thyrotropin activity following the administration of propylthiouracil. The cytometric

values showed a significant rise, being greater in those with exophthalmos and in those with a higher B.M.R. This same group was then given a course of Lugol's iodine solution and in 8 days the thyrotropin activity was evaluated. It was observed that the cytometric values returned to their original values before treatment with propylthiouracil.

In a second group of 17 hyperthyroid patients, cytometric studies were made before and after subtotal thyroidectomy. Before surgery, normal cytometric values were observed. In 8 to 12 months following surgery, cytometric studies showed a rise to 2.9.

These observations were then analyzed by the authors and the possible relationship between hyperthyroidism and hypophyseal thyrotropin hormone was studied. The authors deducted that these observations excluded a pathogenic relationship of thyrotropin to hyperthyroidism. Since thyrotropin activity is normal in hyperthyroidism, they concluded that the pathogenic mechanism is a disturbance of a vascular nature and, more specifically, an inco-ordination of the nerve centers responsible for regulation of the blood supply of the thyroid gland. Thus, they do not attribute increased thyroid activity to an elevation of thyrotropin from the hypophysis.

R. A. MANFREDI, M.D.

Relative Values of Surgery and Antithyroid Drugs in the Treatment of Hyperthyroidism. P. COGNIAUX, P. A. BASTENIE, and CH. FLAMAND. *Acta chir. belg.*, 1952, Supp., p. 107.

This essay offers a fair, up-to-date appraisal of the relative values of surgical interventions and the administration of synthetic drugs, x-rays, or radioactive iodine in the treatment of hyperthyroidism.

According to the authors, neither goiter nor ocular symptoms form integral parts of the syndrome of hyperthyroidism because they cannot be reproduced by the administration of thyroxin. The syndrome is characterized by two biological tests, namely, elevation of organic iodine in the serum and an increased metabolic rate, and the well known clinical signs such as loss of weight, acceleration of the pulse rate, augmentation of the cutaneous circulation, asthenia, tremor, psychomotor agitation, and thermic instability.

Enlargement of the thyroid gland and exophthalmos can be reproduced by injections of thyrotropic pituitary hormone and therefore may be considered diencephalopituitary components of certain forms of hyperthyroidism.

The authors conclude from their exhaustive analysis of various therapeutic measures that in the majority of cases subtotal thyroidectomy, after careful preparation of the patient, remains the method of choice. Since the introduction of antithyroid drugs, especially propylthiouracil, a large number of patients heretofore considered inoperable have become amenable to surgery.

Conservative treatment should be reserved for juvenile patients, those with a slight degree of hyperthyroidism, aged individuals, or those with asystole, and also for recurrent cases. In patients more than 55 years of age radioactive iodine should be employed. Estrogens and cortisone may render service in selected cases but should never be used to the exclusion of other drugs. In addition to physiologic factors and technical considerations, social and psychologic conditions should also bear weight in the selection of the proper therapeutic procedure.

This well balanced presentation of the subject is documented with numerous references. The carefully outlined material has been reviewed in a thorough and modern way and offers a bird's-eye view of this complex and important problem.

This work can be read with profit not only by practicing surgeons but also by those who teach undergraduate and graduate students.

JOSEPH K. NARAT, M.D.

Intraventricular Rupture of a Secondary Carcinoma of the Thyroid with Probable Seeding into the Spinal Meninges. DOUGLAS MILLER and F. CONSTANCE. *Brit. J. Surg.*, 1952, 40: 64.

The authors present an extremely interesting case report in which an unsuspected carcinoma of the thyroid gland presented first as a cerebral cystic tumor which ruptured spontaneously into the left lateral ventricle of the brain. Later metastases in the spinal arachnoid layer were conveyed into the cerebrospinal fluid. Following rupture into the left lateral ventricle, there was a considerable period of apparent recovery after which the cerebral symptoms recurred slowly. Later, intense lower limb pain with no obvious cause was found, which required cordotomy. In the course of the cordotomy, unexplained plaques of new growth were seen in the meninges. Death occurred 4 years after the onset of symptoms. Autopsy examination of what appeared to be a normal thyroid gland revealed areas which proved to be carcinomatous and identical in histologic characteristics with the cerebral and meningeal tumor deposits. The patient was a male, aged 46, with a history of recurrent Jacksonian epileptic attacks occurring about every 3 months over a period of 1 year. The convulsion started in the right arm and became generalized with progressive loss of power in the right arm and hand. Early papilledema occurred and was accompanied by headache and attacks of vomiting. Deep x-ray therapy was given following the tentative diagnosis of a neoplastic cyst within the cerebral hemisphere, and the patient remained well for 2 years. He was readmitted with a recurrence of all of his symptoms, and further x-ray treatment was given. At autopsy the thyroid gland was normal in size and shape, except for two small nodules in the right lobe.

Malignant disease of the thyroid gland is frequently discovered incidentally during the course of a thyroidectomy or in the pathological examination, in more than half of the cases reported. Many writers have reported that between 80 and 90 per cent of carcinomas of the thyroid gland originated in pre-existing adenomas. In 60 per cent of the pa-

tients suffering malignant lesions of the thyroid gland (in one series of cases), the diagnosis was established by microscopic examination after the tumor had been removed. Many of the tumors are of low grade malignancy and they exist for some time without appreciable development. Because of the rich blood supply of the thyroid gland, invasion of veins may occur. Early distant metastases may occur in different organs while the primary growth is still small and inconspicuous, and there have been instances in which there is no clinical enlargement of the thyroid gland and yet patients have died of metastases. These metastases involve the lungs and mediastinum in about half the cases, with the bones being the next most frequent site. This case is an example of such a situation in which there were no clinical manifestations in the thyroid gland, and yet multiple distant metastases had already developed and eventuated in the patient's death.

ALLAN D. CALLOW, M.D.

Intraepithelial Carcinoma (Cancer in Situ) of the Larynx. FRANZ ALTMANN, IRVING GINSBERG, and ARTHUR PURDY STOUT. *Arch. Otolar.*, Chic., 1952, 56: 121.

The histological and clinical characteristics of intraepithelial carcinoma of the larynx are described in detail. A large series of cases has been used as a basis for the findings presented.

In 29 cases studied (Group 1), there was no invasion. The authors believe that the diagnosis of intraepithelial carcinoma could be based on the cellular changes in the epithelium alone. In some instances several biopsies are necessary to confirm the diagnosis.

In a group of 312 laryngeal cancers there were 29 without any evidence of invasion of the underlying tissue; 10 cases showed evidence of infiltrating growth in addition to the intraepithelial spread. This disease is observed about ten times more frequently in men than in women. Radiotherapy has a better chance for success than it has in extensively infiltrating cancers. RICHARD H. BENNETT, M.D.

Cancer of the Larynx and Its Therapy (Il cancro della laringe e sua terapia). V. PRICOLO. *Tumori*, Milano, 1952, 38: 95.

The author reviews the subject of cancer of the larynx and relates his experience. He has observed 184 cases of total laryngectomy. Formerly a large number of patients with cancer of the larynx were treated with x-rays; however, with improvement in surgical technique many are being operated on. At the Tumor Institute of Milan all operable patients are subjected to surgery.

The author prefers to use the term intrinsic for all tumors within the laryngeal cavity, extending from the posterior surface of the epiglottis to the subglottic region, and the term extrinsic for those which extend beyond the cavity.

For intrinsic tumors he performs a total laryngectomy if there is no clinical evidence of cervical node involvement. If the tumor is subglottic or vestibular he performs a node dissection but does not remove the muscles or the jugular vein. When there is clinical evidence or suspicion of cervical node involvement he performs a radical neck dissection on one or both sides, as the condition warrants.

A radical node dissection is performed in all operable cases of extrinsic involvement.

The author has been able to follow his first 100 cases for 3 to 5 years and, of these, 65 are still living and cured. He expects better results in his later and present cases. LUCIAN J. FRONDUTI, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Ventriculocisternostomy in Hydrocephalus (Sulle ventriculo-cisterno-stomie). G. M. FASIANI. *Chirurgia*, 1952, 6: 331.

The author discusses the problem of hydrocephalus and summarizes the surgical treatment that has been attempted up to the present day together with personal observations and contributions.

Surgery for hydrocephalus is concerned only with the relief of obstruction of the cerebrospinal fluid circulation. Other forms of hydrocephalus are not considered in this report. The surgical treatment is based on the concept of Cushing and Dandy that the cerebrospinal fluid is formed in the choroid plexuses of the lateral ventricles and reabsorbed in the cortical subarachnoidal villi. The normal direction is from the lateral ventricles through the foramen of Monroe→the third ventricle→the aqueduct of Sylvius→the fourth ventricle→the foramen of Magendie and Luschka into the basal cisterns to the subcortical arachnoidal villi. Various classifications of hydrocephalus based on treatment may be considered as follows: obstruction due to malformations, inflammations, or neoplasms; ventricular, cisternal, or cortical; and communicating or noncommunicating. Communicating hydrocephalus may be cisternal or cortical, and noncommunicating hydrocephalus may be ventricular and due to neoplasms. In adults it is usually cisternal or cortical, secondary to inflammation and delayed effects of malformation. Surgical treatment has been directed toward:

1. Removal of the obstructing cause.
2. Modification of obstructing conditions (platyplesia—craniovertebral anomalies).
3. Internal deviation of the cerebrospinal fluid (subcutaneously, intramuscularly or into the pleural or peritoneal cavity).
4. External deviation of the cerebrospinal fluid (urinary tract).
5. Formation of new passages (ventriculocisternostomy).
6. Destruction of the choroidal plexus.

To date the best results for the relief of cerebrospinal fluid hypertension have been obtained by ventriculocisternostomy. This can be accomplished by many methods, namely:

1. Direct ventriculocisternostomy of the third ventricle:
   a. Superior (superoptic)
   b. Inferior and lateral
   c. Inferior and median
   d. Superior and inferior median (Stookey and Scarff)
   e. Posterior
2. Indirect ventriculocisternostomy by the method of Torkildsen.

The author presents the results obtained in his personal experience with the procedures of Stookey and Scarff, and Torkildsen. The Stookey and Scarff procedure is done in two stages. Through a right frontal bone flap a superoptic ventriculostomy of the third ventricle is performed. In a second stage, a cannula is introduced into the floor of the third ventricle to communicate with the interpeduncular cisterns. In the Torkildsen procedure, an occipital craniotomy is performed, a groove being formed in the inner plate of the removed segment. The dura is opened above the transverse sinus and a cannula is inserted into the lateral ventricle; it enters the path previously formed in the occipital bone and the distal portion of the cannula placed into the cistern.

In 7 cases in which the procedure of Stookey and Scarff was performed during the years 1941 to 1950 the following early results were obtained:

TABLE I.—EARLY RESULTS OF THE STOOKEY AND SCARFF PROCEDURE

Condition	No. of Cases	Mortality
Stenosis of aqueduct	29	6
Pineal tumors	12	1
Tumors of cerebral peduncles	9	2
Tumors of third ventricle	8	2
Tumors of posterior fossa	6	3
Obstruction of foramen	6	—
Arnold Chiare	1	—
	71	14 (19.9%)

TABLE II.—LATE RESULTS OF THE STOOKEY AND SCARFF PROCEDURE

Patients alive after years	8	7	6	4	3	2	1
Stenosis of aqueduct (21)	2	2	2	2	2	3	4
Obstruction of foramina (2)						1	1
Others (27)			1	3	3	3	4

TABLE III—EARLY RESULTS OF THE TORKILDSEN PROCEDURE

Condition	No. of Cases	Mortality
Tumors of third ventricle	28	8
Craniopharyngeoma	1	1
Stenosis of third ventricle	1	1
Tumors of cerebral peduncles	3	
Chiasmal tumors	1	1
Tumors of posterior fossa	1	
	35	11 (30%)

Late results of the Torkildsen procedure:

Alive after years	3	2	1
Tumors of third ventricle	1	2	8
Chiasmal tumors	1		1

The author concludes that these procedures are not only palliative measures for the alleviation of the consequences of obstructive hydrocephalus, but they also prolong life. R. A. MANFREDI, M.D.

Treatment of Aneurysms of the Cavernous Sinus—Pulsating Exophthalmos (Die Behandlung der Aneurysmen im Sinus cavernosus—Exophthalmus pulsans). P. SUNDER-PLASSMANN and TH. TIWISINA. *Chirurg*, 1952, 23: 376.

Aneurysms of the cavernous sinus characterized by pulsating exophthalmos are usually due to traumas, such as injury by a missile, puncture, or skull fracture, but may also occur spontaneously as the result of a rupture of an artery affected by syphilis, arteriosclerosis, or acute infectious disease.

The arterial blood flows from the internal carotid artery through the dilated cavernous sinus either into the superior ophthalmic vein, the superior cerebral veins, and the sinus petrosus, or through the intercavernous sinuses to the other side, thus creating a bilateral pulsating exophthalmos.

The exophthalmos may appear immediately following the trauma or within a few months.

The differential diagnosis must consider so-called spurious pulsating exophthalmos caused by a congenital defect of the orbital wall with encephalocele, vascular malignant tumors, and racemous angioma.

Percutaneous cerebral angiography is not only of diagnostic value but it also furnishes therapeutic indications.

Conservative measures such as injections of gelatin, galvanopuncture, or orbital injections of blood coagulants usually fail.

The authors report on 5 traumatic arteriovenous aneurysms between the internal carotid artery and the cavernous sinus, and 1 traumatic and 1 spontaneous arterial aneurysm.

A radical operation, namely extirpation of the aneurysm, is technically difficult if not impossible. If a compression of the common carotid artery is not well tolerated for 20 minutes, a partial ligation is indicated to allow the anastomoses between both anterior cerebral arteries to dilate. Ten days later the internal carotid artery is ligated.

Brooks suggested the introduction of a strip of muscle tissue into the internal carotid artery to produce thrombosis of the aneurysm. The authors consider this operation the method of choice in the treatment of traumatic arteriovenous aneurysms of recent origin, provided that the angiogram had failed to visualize the cerebral arteries in the affected area and had demonstrated a sufficient collateral circulation. Otherwise the muscle segment, instead of reaching the aneurysm, may enter the cerebral arteries and thus produce embolism.

JOSEPH K. NARAT, M.D.

Septic Intracranial Complications of Otic Origin (Complicaciones sépticas intracraneanas de origen otico). H. VALLADARES A., and R. POBLETE G. *Rev. otorrinolar.*, Santiago, 1952, 12: 13.

The authors present a study of 109 intracranial septic complications, 34 (31.1%) of which were of otic origin. In this material are included 29 cases of parenchymatous abscess, 3 cases of subdural abscess, and 2 cases of meningitis. Of the 29 parenchymatous abscesses of otic origin, 13 (10 otites and 3 mastoidites) were located in the temporal lobe, 3 (1 otitis and 2 mastoidites) in the parieto-occipital region, 8 (6 otites and 2 mastoidites) in the cerebellum, 2 (otites) involved a cerebral hemisphere, and 3 (2 otites and 1 mastoiditis) were multiple.

Of late years the mortality has been diminishing. In this type of case the mortality from 1940 to 1945 was 52.1 per cent; from 1946 to 1948 the same type of case indicated a mortality of 43.3 per cent, and from 1949 up to August, 1951 it was 21.2 per cent. This improvement is apparently to be ascribed to an earlier and more accurate diagnosis and to use of the newer remedies (antibiotics, etc.).

The localization of the abscess depends as a rule on 3 methods of diagnosis: roentgenography, using air as the contrast material, arteriography, and electroencephalography. The authors do not use lumbar or suboccipital puncture for the purpose of introducing the air; they use double injection into the occipital horns, through two trephination openings which are made under local anesthesia. At the present moment in the authors' work, arteriography is preferred as a diagnostic procedure as it changes the intracranial pressure conditions to permit an exact localization of processes which are localized in the frontal or temporal lobes. This technique is not, however, equal in value to ventriculography in the localization of cerebellar lesions, since the injection of the vertebral arteries with opaque material produces a roentgenologic picture which is difficult to interpret.

The electroencephalogram has an extraordinary localizing value in the lesions of the anterior fossa and seems to be absolutely innocuous. In the case of a cerebral abscess, this method presents sufficient localizing signs so that in all of the authors' recent operations for abscess of the anterior fossa, the unique signs of localization furnished by the electroencephalogram have been considered.

In a few instances the authors have resorted to the technique of extirpation in toto of the abscess. These have been superficially located abscesses, located in the mute zones (frontal or temporal zones); however, in the majority of instances they have used the method of preliminary correct localization, puncture, and drainage introduced by MacEwen, and re-actualized in recent years by L. Mount. The authors believe that no one method should be employed exclusively, and they consider each case as presenting an individual problem.

JOHN W. BRENNAN, M.D.

The Role of Surgery in the Investigation and Treatment of Peripheral Facial Palsy. TERENCE CAWTHORNE. *Lancet*, Lond., 1952, 262: 1219.

Insignificant lesions of a nerve, where it is encased in bone, may cause paralysis. The facial nerve has a longer course in a bony canal than any other nerve and it is paralyzed more often than any other motor nerve. The causes of peripheral facial paralysis are

discussed in a series of 325 cases. The site of the paralysis is divided into intracranial, intratemporal, and extracranial. New growth, multiple sclerosis, and poliomyelitis concern the intracranial part of the nerve, while new growth and injury are responsible for paralysis in its extracranial course. In its intratemporal part, Bell's palsy is by far the commonest lesion with injury; otitis media and herpes are other possibilities.

In Bell's palsy the nerve is seen to be swollen above its exit from the stylomastoid foramen. The term neuritis is applied to the condition, but the author believes ischemia to be much more likely than infection. Exploration of the nerve should be contemplated in cases of complete paralysis when there are no clinical or electrical signs of returning function after a month. In cases of injury with immediate paralysis, operation should be undertaken without delay. When there is an interval between injury and the onset of palsy, or when the palsy is due to acute aural infection, delay is justified.

Exposure of the nerve should be considered in Bell's palsy when the paralysis is complete. This is determined by the electrical reaction and by electromyograms. The probable anatomical site of the lesion should be determined. The surgically accessible intratemporal part of the nerve is between the stylomastoid foramen and the geniculate ganglion. If lacrimation is deficient, the lesion is at or proximal to the ganglion. The causes and sites of the lesions are given in 129 cases, and these are grouped into cases involving the tympanic segment, the bend and upper vertical segment, and the lower vertical segment.

The tympanic segment is approached by the endaural route; the bend and upper vertical segment are approached through the antrum, whereas the lower vertical segment is approached through the postaural route. Manipulation of the nerve is done in a magnified field. Simple decompression may be all that is necessary, but in the presence of injury, end-to-end anastomosis should be secured, if necessary by nerve grafts. Galvanism and support are used until facial movements have started. Occasional cases of intracranial injury to the nerve can only be treated by spinofacial or hypoglossofacial anastomosis.

The results are not discussed in detail but a generally optimistic attitude prevails.

ADRIEN VER BRUGGHEN, M.D.

SPINAL CORD AND ITS COVERINGS

The Differential Diagnosis of Recurrent Hernia of the Lumbar Discs. (Differential diagnose der recidivierenden lumbalen Discushernie). R. H. VON MURALT. *Helvet. chir. acta*, 1952, 3: 189.

Masking symptoms may obscure the clinical picture of herniation of a lumbar disc. On the other hand, the importance of such a condition may be overrated or a mere protrusion may be falsely interpreted as a hernia. Sometimes a thickening or pathologic change of the ligamentum flavum, extradural varicosities or adhesions, marginal ridges, skeletal anomalies, or tumors can be recognized only in the course of the operation.

According to the literature and the author's own experience, from 1 to 2 per cent of all patients operated upon require a second intervention. Such cases can be divided into the following categories:

1. Recurrence caused by secondary degeneration of the adjoining disc, spondylarthrosis with the reactive formation of marginal ridges, prolapse of residues of the disc, or cicatricial formations.

2. Technical errors, such as insufficient exploration, incomplete excision of the disc or overlooking of cicatrical stenoses.

3. Aggravation of the symptoms by excessive removal of skeletal formations important for the maintenance of normal static conditions, rough handling of the nerve roots, primary or secondary infection, or osseous splinters.

JOSEPH K. NARAT, M.D.

Degeneration of the Spinal Cord Associated with Cervical Spondylosis. P. D. BEDFORD, F. D. BOSANQUET, and W. RITCHIE RUSSELL. *Lancet*, Lond., 1952, 263: 55.

In recent years this syndrome has come into greater prominence. The authors present a very carefully prepared case report with complete autopsy findings. The lesions in the cervical column and the accompanying degenerative disturbances in the spinal cord are clearly illustrated and correlated. Although the contribution to therapy is slight, the attempts of others to relieve the condition by operative means are discussed. In the case presented here, the patient was unsuitable for laminectomy.

The authors' patient was a 71 year old woman who, over a period of 3 or 4 months, developed weakness of the legs with numbness of the right arm associated with incontinence and severe constipation. There was a partial Brown-Sequard syndrome with a level at the ninth thoracic segment. There was wasting of the right hand and a right Babinski sign. Spinal fluid examination revealed a partial block with a total protein of 90 mgm. per cent. Radiographically, there was elevation of the right diaphragm and marked degenerative changes in the spine with narrowing of the disc spaces and osteophytic changes. Degenerative changes were found in the spinal cord in the lower cervical segments. The mechanism was thought to be due to abnormal fixation of the spinal cord as a result of unusual tension produced by thickened denticulate and fibrous nerve roots.

ADRIEN VER BRUGGHEN, M.D.

Congenital Tumors of the Spinal Cord in Infants. HENRY G. SCHWARTZ. *Ann. Surg.*, 1952, 136: 183.

Spinal cord tumors in infants are rare. Only 23 such cases, in which the infant was under 1 year old, appeared in the literature for 1951. In 1949,

14 cases of spinal cord tumor associated with dermal sinus were reported. The present article concerns 4 additional cases. In all 4 of these there was an associated sinus, tract, or dimple. It is known that a tract may be a source of meningeal infection or abscess and that removal of a cord tumor is indicated to prevent compression of the spinal cord or cauda equina.

In 2 of the cases under discussion, intraspinal infection occurred; in one of these frank meningitis developed and in the other the infection was more localized but led to paraplegia. In 2 cases the tumors were dermoids, in the third case a teratoma, and in the fourth case a lipoma. In addition to the sinuses which communicated with the dermoids and the teratoma, there were typical pilonidal sinuses in 2 cases. In all of the cases, the skin defects were in the lower lumbar regions.

It is suggested that a common embryological defect may be postulated, which could account for all 4 cases. The case histories with appropriate operative and histologic photographs are presented in detail. ADRIEN VER BRUGGHEN, M.D.

Experimental and Clinical Response of Normal and High Blood Pressure to Severing of the Spinal Vasomotor Path; Hypertension-Cordotomy (Experimentelles und klinisches Verhalten des normalen und erhoehten Blutdrucks bei Durchtrennung der spinalen Vasomotorenbahn; Hochdruck-Chordotomie). H. JUNGE. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 272: 212.

Heretofore uncontested, satisfactory results of surgical treatment of hypertension have been obtained only in 3 groups of cases: (1) unilateral renal lesions, (2) certain suprarenal tumors, and (3) stenosis of the isthmus of the aorta.

Be it Adson-Craig's, Peet's, Smithwick's or Crile's method, the aim of surgery for the relief of essential hypertension is the elimination of vasoconstrictors within a certain area of the body. The enthusiasm concerning the success of such sympathicolytic procedures is gradually subsiding. Section of anterior spinal roots has fallen into oblivion and is not practiced because a very extensive laminectomy is required and a motor paresis of nearly all muscles of the trunk follows the operation.

The vasomotor paths may be interrupted still higher, namely, within the spinal canal.

The author produced hypertension in dogs by intracisternal injection of kaolin according to Dixon-Heller's technique. After a bilateral cordotomy at the first thoracic level the blood pressure fell rapidly below the normal level, and later the blood pressure rose higher but never reached the original level recorded before the cordotomy.

Hypotension was recorded by the author in several patients with normal blood pressure following unilateral cordotomy performed for relief of pain caused by cancer of the rectum or the bladder. After several weeks the blood pressure returned to the preoperative level.

Cordotomy should be reserved for elderly, poor risk patients or for those with malignant hypertension in whom the vital indication outweighs slight postoperative neurologic disturbances.

JOSEPH K. NARAT, M.D.

PERIPHERAL NERVES

Some Apparent Paradoxes in Surgery of the Peripheral Nerves (A propos de quelques paradoxes apparents de chirurgie nerveuse périphérique). CARAYON and BEZES. *Mém. acad. chir.*, Par., 1952, 78: 515.

A number of articles have been published in which unexpected improvement, or even complete recuperation of a severed nerve, was reported immediately after nerve suture. Such observations are in contradiction to the established beliefs regarding nerve regeneration, which is extremely slow. However, the possibility of paradoxic rapid restoration of nerve conduction is accepted by some authors.

The authors of the present article report a series of 10 pertinent cases and give interpretations of these paradoxic phenomena. In 7 cases the nerve (medianus and/or ulnaris) was severed completely without any symptom of conduction interruption; in the other cases only symptoms of partial interruption occurred after complete severance.

Several possibilities are discussed to explain these observations. Normal as well as abnormal anastomoses were found between the median, the musculocutaneous, and other nerves distal to the site of injury, which made continuation of conduction after the interruption possible. Furthermore, immediate postoperative improvement is explained by neurolysis of a sensory branch originating above the site of injury, or by removal of scar tissue which had arrested the influx of nervous stimuli.

In summary, the authors reject all statements of a "grace period" of the severed nerve, or the possibility of immediate recuperation after suture. They believe that all such reports in the literature are due to errors of interpretation.

WERNER M. SOLMITZ, M.D.

Observations on Spinal Nerve Root Transplantation in the Male Guinea Baboon. L. W. FREEMAN. *Ann. Surg.*, 1952, 136: 206.

Knowledge of the mutual importance of Schwann cells and neurons in regenerating neural tissue suggests that nerve roots may have regenerative powers equal to, or greater than, peripheral nerve. Previous operative experience in humans has confirmed the importance and ease of using the fibrin suture technique in nerve root anastomosis. Following nerve root anastomosis, the problem of functional recovery is clouded by disuse atrophy, contractures, and trophic changes which have already occurred in muscle at the time of reinnervation. For this reason, restoration of penile erection was selected as an indication of functional recovery, after transplantation of appropriate nerve roots in the baboon.

In 6 immature male guinea baboons, sacral pairs of anterior roots were sectioned and anastomosed by the fibrin suture technique to proximal coccygeal or lumbar roots. Similarly, proximal sacral roots were anastomosed to distal lumbar and coccygeal roots. In two control baboons, bilateral lumbar sympathectomy was done. A third control had the routine section and anastomosis, except that the third sacral pair was not included in the procedure. Complete erectile ability returned in a few days in all controls. Of the 6 experimental animals, 1 showed unsustained erections in the early postoperative months. Sustained erection returned in all remaining 5 animals in 7 to 11 months and, once attained, remained a constant finding until death. Histologic sections showed satisfactory anastomosis in all but one suture level. Microscopically, regenerating axons were observed in approximately equal numbers in both segments, although there were occasional sparsely populated roots.

The author believes that these studies contradict the present concept of "delimited localization of centers of function," and give additional value to the concept of plasticity in the central nervous system. He suggests that relatively crude patterns of activity such as penile erection, bladder and bowel function, and walking do not require a fixed neural pattern and can be controlled readily by neurons of another level. From a practical consideration, it is suggested that patients handicapped as a result of congenital abnormalities, poliomyelitis, or cauda equina injury might benefit from similar procedures. GEORGE M. AUSTIN, M.D.

SYMPATHETIC NERVES

Effect of Sympathectomy (Smithwick) upon Retinal Changes in Arterial Hypertension. Clinical Study of 40 Cases (Action des résections sympathiques, type Smithwick, sur les altérations neuro-rétiniennes de l'hypertension artérielle. Étude clinique d'une quarantaine d'observations). L. GUILLAUMAT. *Sem. hôp. Paris*, 1952, 28: 2277.

Forty patients, 28 of whom were women, were treated by the Smithwick procedure for arterial hypertension. A unilateral procedure only was done in 9 of the 40 cases. There were 4 deaths, 3 of which occurred among the patients treated unilaterally.

Ophthalmologic examination was carried out, and in the majority of cases only slight alterations of the caliber of arteries and some arteriovenous compression were noted. Hemorrhages or exudates, or both, were found in the minority of cases. In the majority of these 40 cases there was some degree of edema of the nerve head. In 33 patients special measurements of the amount of tension needed to efface the central retinal artery were made, without anesthesia. Normal arteries were effaced at a pressure varying between 25 and 60 gm. In the 33 cases, the measurements ranged between 50 and 120 gm. The majority of these fell below the 70 gm. level. A disproportionately high reading was believed to prognosticate a poor result following the sympathectomy. Further factors which apparently prognosticated a poor result included the male sex, elevated renal insufficiency, and enduring papilledema which was considered responsible for the slow development of a dissociated ratio between the retinal humeral pressure and the arterial diastolic pressure. The presence of hemorrhages or exudates was not a contraindication to the performance of sympathectomy.

Among the 18 patients who showed a normal ratio between the retinal arterial tension and the diastolic blood pressure, 11 benefited from the operative procedure. Among the 14 patients with a disproportionately high retinal arterial tension, only 4 showed satisfactory results postoperatively. It was likewise to be noted that all 4 patients who succumbed postoperatively demonstrated such an increase in retinal arterial tension.

The author considers that the performance of dynamometric readings is essential in the complete evaluation of a patient with arterial hypertension who is being considered for sympathectomy.

W. EUGENE STERN, M.D.

The Effect of High Lumbar Sympathectomy in Patients with Organic Arterial Diseases of the Lower Limb Previously Treated with Low Lumbar Sympathectomy. BJÖRN L. LINDSTRÖM. *Acta chir. scand.*, 1952, 103: 370.

The author's series of 14 cases comprised 18 extremities. Nine patients suffered from thromboangiitis obliterans and the remaining 5 from arteriosclerosis. Follow-up examinations revealed that 9 extremities (50%) showed improvement after resympathectomy, 7 extremities were not influenced, and in 2 cases, even though the rise in skin temperature was favorable, the practical effect was difficult to evaluate. The walking distance in some cases was trebled. In 4 of 6 extremities the pain ceased with rest. In cases in which edema or signs of necrosis occurred simultaneously, the condition deteriorated.

The satisfactory results of the resympathectomies were not dependent on the number of ganglia extirpated. Even cases in which only one ganglion was resected showed improvement. The important point was, thus, that the high lumbar ganglia were resected. The advantage of high lumbar sympathectomy including the first lumbar ganglion was complete denervation of the lower extremity and a lesser tendency toward reinnervation. Double resection of the first lumbar ganglion may bring about disturbances in ejaculation. The phenomenon was inconstant. In this series such disturbances did not occur. The authors advise against double high lumbar sympathectomy including the first lumbar ganglion in young men. An age up to 60 years is not thought to constitute a contraindication to the operation.

The authors give three indications for lumbar resympathectomy. It is indicated (1) if there is an increase of the skin temperature of 1°C or more as

a result of sympathetic blocking, (2) if the sympathetic blocking results in relief of the rest pain beyond the time of the temporary effect of the blocking (particularly in the cases of lumbar anesthesia), and (3) if the main symptom is intermittent claudication from obliteration of the femoral artery or of the more proximal arterial trunks, even though the foot is otherwise warm and does not exhibit local symptoms.

The author summarizes by saying, "In organic arterial diseases of the lower extremities only high lumbar sympathectomy should be performed, particularly in routine surgery which does not entail preoperative special examinations."

DAVID G. FREEMAN, M.D.

MISCELLANEOUS

Surgical Care of the Neurologically Defective Infant. JOHN MARTIN. *Arch. Surg.*, 1952, 65: 150.

Dividing the surgically remedial lesions in the neurologically defective child into three large groups—hydrocephalus, hematomas and hygromas, and meningoceles—the author rather enthusiastically describes what can be expected from the operative treatment of these lesions. The author's principal plea is that these unfortunate children not be neglected, but that at an early date every effort be made to give them the benefit of early diagnosis. He also urges that once it has been determined the situation is not hopeless, the attending physician have the courage to do whatever may be possible to give these infants some increased measure of anatomical and physical efficiency.

In the treatment of hydrocephalus, he describes the technique for ventriculogram and dye test as important in the diagnostic work-up. The various operative procedures include choroid plexectomy, third ventricular puncture, ventriculocisternotomy, and the newer "exteriorization" procedures which conduct the excess fluid to other body cavities for reabsorption.

Pointing out that intracranial hematomas and hygromas may occur with or without a history of trauma, the author draws particular attention to the picture of convulsions and poor postpartum progress as being typical of these conditions. He does not believe that subdural taps through an open fontanelle are sufficient, but that burr holes and, at times, a bone flap with removal of membranes are necessary.

Concerning the treatment of meningocele, the author points out that fairly prompt care of these lesions offers the best chance for correction of the neurological defect. While he does not give the specific indications for surgery, he does note that considerable ingenuity must at times be employed in order to close the larger defects.

JOSEPH RANSOHOFF, M.D.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Fibrocystic Disease of the Breast. Evolution of the Medical Attitude in Regard to the Disease of Paul Reclus (La mastopatia fibrocistica. II. Evoluzione del pensiero medico intorno alla malattia di Paul Reclus). GIUSEPPE BARBIERI and MARIA OLIVI. *Lav. ist. anat. Univ. Perugia*, 1951, 10: 163.

This paper represents an extremely detailed review and analysis of practically all available literature, from the original article by Reclus to the most recent publications.

The authors first give an abstract of the historical aspect of the topic and discuss in great detail the evolution of the medical way of thinking as to the pathogenesis of the disease. After having analyzed the various pathogenic theories based upon inflammatory, neoplastic, and hyperplastic changes as well as upon malformations, they reach the conclusion that the pathology in question is considered in our day as a hyperplastic-dysplasic disease, the origin of which is an endocrine imbalance characterized by an excess of estrogens.

Furthermore, they refer to the various experimental studies which were carried out in order to reproduce similar conditions in the animal, and briefly describe the well known symptomatology of the disease.

As to the question of any existing relationship between fibrocystic disease and cancer of the breast, the authors conclude that most authorities agree to consider the disease as a precancerous lesion.

R. SCHOBINGER VON SCHOWINGEN, M.D.

Tumors of the Male Breast; Survey of Material Operated on in Finland. VISA JÄÄSKELÄINEN. *Ann. Med. exp. fenn.*, 1952, 29: Supp 4.

This is a beautifully written, comprehensive tome on tumors of the male breast. The historical review comprises a bibliography of value. The pathological anatomy of benign and malignant tumors and of gynecomastia are considered separately and in detail with excellent supplementary photomicrographs.

The etiology of tumors of the male breast is discussed with consideration of the heredity, trauma, inflammation, earlier disease, concommitant diseases, and gynecomastia.

The clinical picture, differential diagnosis, treatment, and results are presented in considerable detail.

THOMAS LANE STOKES, M.D.

Carcinoma of the Breast and Skeletal Metastasis in a Clinicoroentgenologic Series. SELMER REENES. *Acta chir. scand.*, 1952, 103: 363.

In a series of 100 cases of carcinoma of the breast with secondary tumor of the bone the first skeletal manifestation in most cases (77 per cent) occurred in the spine and pelvis.

Spread to the bone in most cases (73 per cent) occurs within 3 years. The average survival was 28.4 months for patients with a duration of the anamnesis of less than 1 month as compared with 43.4 months for those with a duration of more than 1 year.

JOHN J. MALONEY, M.D.

The Logical Operation for the Treatment of Cancer of the Inner Quadrants of the Breast (L'intervention logique pour le traitement des cancers des quadrants internes du sein). J.-L. BRENIER. *Mem. Acad. chir.*, Par., 1952, 78: 574.

The author discusses the poor results following mastectomy for carcinoma of the inner quadrants of the breast as compared with statistics of operative results in cases of tumors in the outer quadrants, and describes an operation which he believes to be more effective.

The incision is a transversely placed elliptical one, 7 to 8 cm. from the tumor. The costal cartilages of the second, third, and fourth ribs are excised; the internal mammary vessels are ligated beneath the first and fifth ribs; the vessels and the intercostal muscles are then excised with the pectoralis major and breast. The pleura is not opened. The defect in the rib cage is closed by suturing a nylon patch over the area.

This extension of the "radical" mastectomy has been supplemented by a supraclavicular dissection when the tumor is in the upper inner quadrant. The clavicle is not divided.

The reporter of the present article, Funck-Brentano, comments that he has performed 2 such operations and has found it unnecessary to use nylon to cover the rib defect. He has used a more standard vertical incision.

The author hopes to improve the survival time by this means since he has found malignant invasion of the extra lymph nodes thus removed.

THOMAS C. DOUGLASS, M.D.

TRACHEA, LUNGS, AND PLEURA

Ischemia of the Lung. BRIAN BLADES, EDWARD J. BEATTIE, JR., ROBERT P. HILL, and RICHARD THISTLETHWAITE. *Ann. Surg.*, 1952, 136: 56.

Although the circulatory system of the lungs has been the object of investigation for over a century, there are still misconceptions and gaps in our knowledge. With the idea of possible eventual pulmonary surgery in a bloodless field, it seemed expedient to determine how long the lung will remain viable if its entire circulation is occluded. Twenty-nine dogs were studied after periods of ischemia varying from 30 to 360 minutes. Ischemia was produced by dissecting free the pulmonary vessels and occluding them with tape and similarly obstructing the pulmonary hilum, including the bronchus and bronchial

artery. After 30 to 45 minutes of occlusion, some difficulty was experienced in re-expansion of the lung but no characteristic difference could be demonstrated pathologically between the ischemic lung and that of a control. Arterial oxygen saturation studies showed a fall of about 10 per cent as early as 15 minutes postoperatively. Incisions into 2 lungs after 60 minutes of ischemia showed normal-appearing healing 14 days later.

The method may prove of value for producing a bloodless field in certain types of pulmonary surgery and in lung transplantation, and it may influence techniques of maintenance of extracorporeal circulation, but further studies are necessary prior to its use in human beings. THOMAS LANE STOKES, M.D.

Importance of Prophylactic Bronchoscopic Exploration for Surgical Procedures Performed for Pulmonary Tuberculosis (Sull'importanza dell'esplorazione broncoscopica preventiva negli interventi di chirurgia della tubercolosi polmonare). CARLO BORSELLA and CARLO FELICE PORTA. *Chir. torac.*, 1952, 5: 78.

The authors state that the exact location of tracheobronchial lesions, their anatomic character, and the stage of their evolution, all important factors in the choice of the surgical procedure or in deciding whether the condition is operable, can be determined by bronchoscopy.

As a rule, tuberculous patients tolerate bronchoscopy well. An irreversible stenosis of the bronchial tree, detected by bronchoscopy, may be considered a contraindication to collapse therapy of the corresponding pulmonary segment.

The value of bronchoscopy preceding surgical procedures on the lungs is illustrated by several case reports. JOSEPH K. NARAT, M.D.

Indications and Results of Segmental Resection in Lung Tuberculosis. L. D. EERLAND. *J. internat. chir.*, Brux., 1952, 12: 79.

Segmental resection of pulmonary tissue with maximum saving of sound lung has become especially important since the advent of exeresis surgery in pulmonary tuberculosis. By careful selection of cases with a stage of general and local tissue immunity, and the auxiliary use of streptomycin, results have been good. An impression of the patient's immunologic situation is drawn from anamnesia and from all clinical and roentgenologic data (planigraphy, bronchography) obtained during a sufficient period of observation. Bronchoscopy is advisable to rule out a tuberculous bronchitis in the bronchus to be amputated.

Indications for resection therapy partly depend on the results of spirography, separate bronchospirometry, and determinations of residual air since segmental resection will rarely improve a precarious functional situation, while any complication after resection in a patient with poor pulmonary reserve may be disastrous.

The functional loss after extrapleural pneumothorax and thoracoplasty is greater than after segmental resection in which little ventilatory function or oxygen uptake is lost. Segmental resection is better tolerated and usually has a smaller postoperative mortality. The presence of indurated disseminated foci is not considered an objection to the performance of segmental resection and they recommend removal of any segment containing proved cicatrix of a cavity. They review the literature on indications for resection of cavernous and noncavernous tuberculosis and heartily recommend conservative therapy when excreted bacilli are streptomycin-resistant.

In general, they follow the surgical technique of Monod for segmental resection, but detail their deviations therefrom. They have had experience with segmental resection in 176 patients. Of these, 40 were operated on for bronchiectasis, 2 were operated upon for pulmonary cyst, and 134 for tuberculosis. The indications for surgery, type of operation, the complications, and results are presented concisely, but with considerable tabular detail.

The observation period was for over 6 months in 86 patients and for over a year in 30 patients. Sputum conversion was 94.3 per cent in this first group. Functional studies postoperatively are included; they are of considerable interest and, in general, are good. THOMAS LANE STOKES, M.D.

Mixed Tumors of the Lung: A Re-Appraisal. J. L. EHRENHAFT and NATHAN A. WOMACK. *Ann. Surg.*, 1952, 136: 90.

In 1938 Womack and Graham presented a series of mixed tumors of the lung. This is an additional collection of 14 interesting cases which are similarly classified.

These tumors are most often composed morphologically of a mixture of tissues representing differentiation rather than modulation. They contain groups of cells usually epithelial and much alike, but growing in odd morphologic patterns with a tendency to permeate or invade. Usually there is a mesenchymal framework composed of reticulum and lined with cells resembling and functioning as endothelium. The endothelium lines sinusoidal spaces filled with blood, into which epithelial cells project. There may be collagen formation, bone, cartilage, or smooth muscle.

Most commonly these tumors occur in individuals younger than those with squamous cancer of the bronchus and they are more frequently found in females. The symptoms and signs are usually those of mechanical obstruction of the bronchus, especially atelectasis with superimposed infection; occasionally there is hemoptysis and the symptoms are apt to be sudden in onset.

There is early local invasion but distant metastases are usually late so that extirpative surgery affords good results. These tumors are not considered as adenomas; they should be regarded as malignant growths. The failure of proper tissue co-ordination in the pulmonary development is implicated in their etiology. THOMAS LANE STOKES, M.D.

The Cytologic Examination of Sputum and Its Value in the Diagnosis of Bronchogenic Carcinoma (Il valore dell'esame citologico dell' espettorato nella diagnosi di cancro primitivo del polmone). M. FABBRINI. *Riforma med.*, 1952, 21: 570.

The growing incidence of bronchogenic carcinoma calls for a greater number of procedures allowing the early diagnosis of the disease, especially since its initial period is characterized by an almost asymptomatic evolution. The duration of this asymptomatic stage ranges from 6 to 9 months. It is during this very period that the chances for successful therapy are the highest. The fact, furthermore, that the period of survival of the nontreated patients lies between 11 and 14 months only demonstrates the importance of an accurate and early diagnosis.

A review of the literature precedes a short discussion of the value of roentgenologic and bronchoscopic examinations in the diagnosis of bronchogenic carcinoma.

From the 70 cases studied by the author, 57 were considered of statistical value since in only these instances the examination of sputum could be completed by the histopathologic study of tissue obtained during bronchoscopy, surgery, or autopsy. The results from both examinations were compared, and it was found that the sputum contained neoplastic cells in 30 instances (52.5%) while 21 cases (36.8%) were reported as negative and 6 cases (10.7%) as doubtful.

After mentioning some technical details concerning the fixation and the coloration of the sputum preparations, the author discusses the histological characteristics of the tumor cells and submits a series of photomicrographs related to this particular subject. Of great histological importance appear to be changes affecting the number and the volume of the nucleoli or alterations affecting the relationship between nucleus and nucleolus as well as between nucleus and cytoplasm.

A negative sputum examination does not prove the absence of a malignant lesion. An error in laboratory technique, an inadequate sample of sputum, the presence of bronchial stenosis proximal to the tumor, or the fact that because of its stage or location the neoplasm did not yet erode the bronchial mucosa may render impossible the demonstration of tumor cells.

The presence of any chronic pulmonary disease with a nonspecific symptomatology, doubtful radiologic picture, and negative bronchoscopy represents the main indication for the cytologic examination of sputum. R. SCHOBINGER VON SCHOWINGEN, M.D.

Fibrosarcoma of the Bronchus. CLIFFORD F. STOREY. *J. Thorac. Surg.*, 1952, 24: 16.

Primary fibrosarcoma of the bronchus should be considered an uncommon lesion. The literature contains approximately 7 well authenticated cases which fulfill the criteria of a true fibrosarcoma of the bronchus. However, the older literature on pulmonary sarcoma is replete with such cases now known to be erroneously labelled. In a series of 362 fibrosarcomas from all locations, only 4 appear to have developed in pulmonary tissue, lungs, bronchi, or pleura. The diagnosis of fibrosarcoma made by bronchoscopy and biopsy has also been rare. The treatment of pulmonary fibrosarcoma has varied from repeated bronchoscopic fulgurations to radical pneumonectomy to massive irradiation.

In the present article, 3 cases of fibrosarcoma are proved. The clinical course after pneumonectomy indicated this to be a highly fatal condition causing death in the 2 advanced cases within 2 years after the onset of symptoms. Death was due to distant and local metastases and there seemed to be a predilection for hematogenous spread.

Conservative treatment, such as local excision by bronchoscopy, is fraught with danger for the patient. Fibrosarcoma of the bronchus should be differentiated from bronchial adenoma; nevertheless both are treated by excisional surgery. Total pneumonectomy with radical mediastinal dissection is indicated when the fibrosarcoma shows penetration into the lung, infiltration of the mediastinum, or local lymph node involvement.

B. G. P. SHAFIROFF, M.D.

Pulmonary Fibrosarcoma (Il fibrosarcoma del polmone). G. FOJANINI and S. ARMENIO. *Arch. ital. chir.*, 1952, 75: 87.

The authors describe a case of fibrosarcoma in a 26 year old male. In this case a pneumonectomy was performed for a pulmonary tumor which proved to be a fibrosarcoma.

An extensive review of the literature is presented. Reports of only 23 cases could be found. Many cases of tumors reported as fibrosarcomas were excluded because there was not enough evidence to warrant the diagnosis.

The clinical picture resembles that of cancer and only in cases in which a biopsy is possible can the diagnosis be established preoperatively.

There is a diversity of opinion as to the prognosis, and the authors are inclined to agree with Stohr and Sachs who feel that in a certain group of cases the tumor is slow-growing and late in metastasizing. Because of the small number of cases reported, it is believed difficult to formulate a definite plan of therapy. LUCIAN J. FRONDUTI, M.D.

Bronchus Blockade; a Study to Determine the Functional State of the Lungs before Pneumonectomy (Der Bronchusblockadetest. Ein Beitrag zur funktionellen Beurteilung der Lunge). W. AUERSWALD, E. STRAHBERGER, M. WENZL. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 272: 157.

The insufficiency of preoperative studies of pulmonary function became apparent to the authors in a large series of pneumonectomies for carcinoma of the bronchus. Especially the determination of the vital capacity proved to be of little help in determining whether a patient would have a significant de-

crease of pulmonary function following operation. Bronchospirography, although a valuable measure, is too complicated a procedure and requires a well equipped laboratory with excellent gas analytic methods. The authors, therefore, developed a bloodless procedure which allows more accurate prognostication than ordinary standard measures. It was applied to 25 patients suffering from bronchogenic carcinoma between 50 and 65 years of age. Controls were carried out on normal persons.

Preliminary medication is given with 0.02 gm. of pantopon and 0.05 gm. of atropine, and local anesthesia of the respiratory tract is produced with 2 per cent procaine. A 16–18 rubber catheter is introduced with a laryngoscope. This Maurath catheter carries a balloon at its tip which is inflated after it is positioned in the main bronchus. The right bronchus requires more care in positioning the balloon because of its short upper bronchus which also has to be occluded. After inflation the capillary oxygen saturation is determined in 2 second intervals. This is done by Kramer and Matthes' photoelectric method on the histamine-prepared ear lobe. The method is based on the principle that oxyhemoglobin is more readily penetrated by red light than reduced hemoglobin. Little difference is found in the absorption of infrared light. Local factors are excluded by the histamine treatment of the ear. Care must be taken to avoid gagging and coughing.

At first the diseased bronchus is blocked. If severe dyspnea occurs the test is interrupted before the ordinary test time of 90 seconds. Then the opposite bronchus is occluded. In 10 instances there was no measurable fall of the oxygen saturation of the capillary blood when the diseased bronchus was blocked. This indicated that the diseased side of the lung had no longer any significant respiratory function. Resection in these cases was therefore carried out without functional difficulties. It is interesting to note that the size of the bronchial lesion could not be made responsible for the loss of the pulmonary function. It remains obscure why in some instances the healthy lung had taken over practically all respiratory function although the carcinoma had not caused complete occlusion of the opposite bronchus.

In 15 cases the diseased and the healthy lung shared almost equal parts of the respiratory load, which was indicated by a significant fall of the oxygen saturation when either bronchus was blocked. Regarding these cases no definite statements could be made as to the prognosis after pneumonectomy. Carlens has devised a method to gain additional information by introducing an inflatable tube into the corresponding pulmonary artery. In patients who are to have no decrease of pulmonary function following pneumonectomy the oxygenation of the capillary blood returns to a normal level (after having been reduced by the described method) if the corresponding artery is blocked. This procedure, however, is not harmless and more or less equals an exploratory thoracotomy with constriction of the structures to be resected.

No information on the postoperative findings in the latter group of patients can be gained from the article. Several tables illustrate the type of curve obtained with the method described.

KURT BENIRSCHKE, M.D.

The Use of Paraffin as an Aid in Obliterating the Pleural Space Following Total Pneumonectomy. W. E. ADAMS and JAMES M. FRITZ. *Ann. Surg.*, 1952, 136: 18.

The complications most frequently encountered as a result of persistent pleural space are infection of the pleural cavity with or without bronchopleural fistula, and altered cardiorespiratory physiology due to a shift of the mediastinum to the operative side. Over a 4 year period 6 patients were treated for one of these complications by obliteration of the pleural space with paraffin. Four of the pneumonectomies which preceded the complications were done for a primary pulmonary malignancy and 2 for nonspecific inflammatory disease. All 6 patients had right pneumonectomies, which are considered more likely to give rise to cardiorespiratory functional complications.

Case histories illustrating a wide span of complications and the results of therapy are given in interesting detail. Usually such complications are treated by: (1) thoracoplasty alone without drainage (in the absence of infection), (2) drainage of the empyema with or without thoracoplasty, or (3) chemotherapy of the infected pleural space with or without drainage or thoracoplasty.

The authors emphasize the disadvantages of these methods and recommend extrapleural paraffin packs or thoracoplasty with subscapular paraffin packs.

THOMAS LANE STOKES, M.D.

HEART AND PERICARDIUM

Experimental Methods for Detection of Changes of the Blood Supply to the Heart. ALFRED GOLDMAN, CLINTON SHAW, ELIOT CORDAY, JOSHUA FIELDS, and Others. *J. Thorac. Surg.*, 1952, 24: 105.

It is difficult to evaluate changes in the blood supply to the heart and as a result procedures designed to improve this supply cannot be assayed. The methods used are outlined. They consist mainly of myocardial irritation which causes the pericardial collaterals to develop, the application of pedicles of omentum or muscle to the heart, or direct arterialization of the myocardium or coronary sinus.

After demonstrating collateral channels in normal and damaged myocardium, the authors used the following tests to evaluate the procedures outlined above:

1. The injection of fluorescein intravenously and subsequent photographing of the heart under ultraviolet light before and after the experimental procedures.

2. Cinematographic measurement of the degree of "ballooning" of the heart wall which occurs in an infarcted area.

3. Direct electrocardiography of the heart following experimental damage with emphasis on the Q and R changes.

These tests are helpful in evaluating the surgically induced auxiliary collateral circulation in the dog.

ROBERT L. CRAIG, M.D.

Mitral Stenosis. EGBERT H. FELL, OGLESBY PALL, JAMES A. CAMPBELL, CARL B. DAVIS, and Others. *Arch. Surg.*, 1952, 65: 128.

The authors discuss the surgical procedure used in 10 patients suffering from mitral stenosis. Their ages ranged from 25 to 42 years, and 7 of the patients were women. Eight of the 10 patients survived and 7 of these have been followed up from 2 to 6 months; all of them were benefited.

The chest was entered laterally through the left fourth intercostal space and a combined and modified Souttar, Bailey, and Harkan technique was employed. After entrance into the auricle under the usual stay suture precaution, the index finger bearing the Bailey knife was introduced down to the level of the mitral valve. After careful examination of the valve with special care to note its size, the instrument was introduced in such a manner as to incise the valve in its lateral and medial aspect. As the finger was withdrawn the purse-string suture was tightened in such a manner that very little blood was lost during this part of the procedure. The raw edges of the auricular appendage were oversewn with silk.

It is concluded that patients suffering from mitral stenosis are greatly benefited by surgery, which offers them the best opportunity to return to a more normal life. STEPHEN A. ZIEMAN, M.D.

The Technique of Producing Mitral Stenosis of a Controlled Degree. ROBERT G. ELLISON, ROBERT C. MAJOR, RAYMOND W. PICKERING, and WILLIAM F. HAMILTON. *J. Thorac. Surg.*, 1952, 24: 154.

Graded mitral stenosis can be produced in dogs by passing a nylon-covered wire suture around the base of the mitral valve and gradually tightening it from outside of the chest cavity. The tightening is done 2 to 3 weeks after operation through a cannula with flanged ends. This had been placed with contained sutures between the heart and the chest wall at the time of operation, after the ends of the special suture material had been picked up through a small subcutaneous incision. The degree of tightening is determined by noting changes in the rate or volume during palpation of the femoral pulse.

By this procedure, 10 dogs were precipitated into cardiac failure, frequently with ascites and edema. This failure occurred in spite of minimal elevation of the return venous pressure. ROBERT L. CRAIG, M.D.

Treatment of Mitral Stenosis by Finger Fracture Valvulotomy. FRANK GERBODE, EMILE HOLMAN, and HERBERT HULTGREN. *Arch. Surg.*, 1952, 65: 113.

Of the various techniques advocated for the treatment of mitral stenosis, the authors believe that finger fracture has the greatest ease of application and is probably the best available method for surgical treatment in the great majority of patients.

Forty-four patients with mitral stenosis were operated upon by the fracture method during the past 15 months with 5 operative deaths.

Fourteen of the 44 patients were observed for 4 months or longer. The immediate result in most of the remaining 30 patients was very satisfactory, but not sufficient time has elapsed to permit ample evaluation. Nine of the 14 patients had marked improvement, 2 had moderate improvement, and 3 showed slight or no improvement.

Twelve patients, however, were studied physiologically by means of cardiac catheterization before and after operation. Contraindications to operation are considered to be uncontrollable failure, moderate to severe mitral regurgitation, other valvular involvement, enlargement of the left ventricle, active rheumatic disease, and endocarditis. Auricular fibrillation and slight mitral regurgitation are not contraindications.

An anterolateral approach through the fourth interspace with division of the third and fourth costal cartilages is employed.

Segments of the third and fourth costal cartilages are excised to prevent rubbing postoperatively. Cartilages are not resutured because in a few weeks a firm fibrous union results and the pericardium is usually opened anterior to the left phrenic nerve. It is believed advisable to divide the internal mammary artery. A rubber-shod lung clamp is used for traction on the auricle and the incision into the auricle is made in the segment beyond the clamp, care being taken to sever the chordae tendineae.

Two sutures at each end discourage tearing during the intracardiac manipulation. While the assistant removes the clamp, the finger is inserted into the atrium. During the intra-atrial exploration and valvulotomy a little tension is maintained on the purse strings to prevent bleeding and the first assistant ties the lowermost purse-string suture while the finger is withdrawn. The second string suture is then tied and it may be necessary to reapply the clamp. STEPHEN A. ZIEMAN, M.D.

Surgical Approach for Stenotic Lesions of the Semilunar Valves by Excision and Cusp Replacement Under Direct Vision. ROBERT S. LITWAK, HOWARD L. GADBOYS, GEORGE B. SCOTT, and JOSEPH F. FERRARA. *J. Thorac. Surg.*, 1952, 24: 165.

Relief of pulmonary and aortic valvular stenosis has been accomplished by blind dilatation. In an attempt to repair valvular defects under direct vision the authors have developed a new instrument which is introduced through the ventricle into the valvular region. Outside ring pressure over the inside baffle plate provides hemostasis while the vessels are incised. With this instrument one cusp may be excised.

Pulmonary cusp resection and replacement with a donor homograft in 18 dogs resulted in 10 failures; there were 9 failures in 9 dogs with aortic valvular replacement. This method is thought to be unsatisfactory because of microscopic and gross changes in the grafts which seem to militate against success.

Pulmonary valvular resection and replacement with a homograft of vessel wall which has an attached cusp of autogenous pericardium produced a successful flap valve in 8 of 9 dogs. There were 9 successful replacements of an aortic cusp in 12 dogs. This method seems to offer a possible approach to surgical relief of valvular stenosis without the production of regurgitation, but long range evaluation is needed. ROBERT L. CRAIG, M.D.

Some Physiologic Aspects of the Artificial Heart Problem. F. D. DODRILL, EDWARD HILL, and ROBERT GERISCH. *J. Thorac. Surg.*, 1952, 24: 134.

The authors made 65 experiments on dogs with an artificial heart. These included: (a) substitution on the right side, (b) a complete extracorporeal circulation with mechanical oxygenation, and (c) substitution on the left side.

No animals died of infection. This was due, they thought, to their type of pump which was sterilized by autoclaving.

The viscosity of the blood was profoundly lowered following the administration of large quantities of citrated blood.

There are profound atriopressor reflexes present on the right side of the heart in dogs which greatly lower the systemic blood pressure; in fact, the authors found it necessary to support the blood pressure by large transfusions as well as by the administration of vasoconstrictor drugs.

This atriopressor reflex is not present on the left side in dogs or, at least, is not present to the same degree. As a general rule, a drop in the systemic blood pressure is rarely obtained.

A method of determining when all the blood bypasses the heart is presented. It is based on the particular type of arterial pressure pattern obtained.

ROBERT L. CRAIG, M.D.

Hypothermia as a Means of Performing Intracardiac Surgery Under Direct Vision. BRIAN A. COOKSON, WILFORD B. NEPTUNE, and CHARLES P. BAILEY. *Dis. Chest*, 1952, 22: 245.

Bigelow and his associates demonstrated that when the body temperature of a dog drops to 20° C., the metabolism and oxygen demands of the body are reduced to approximately 18 per cent of normal. Using this method, the authors found that dogs could survive occlusion of the superior and inferior venae cavae for at least 15 minutes without brain damage. Survival in their group was 15 per cent in 39 experiments. The authors then carried out 10 preliminary experiments in which they occluded the venae cavae for 12 minutes and evolved a standard procedure. They then performed a cardiotomy on the right ventricle in 11 consecutive dogs with 9 survivals. A good description of the technique used in this procedure is given.

Among 11 dogs in which the technique described was used, there was only 1 with ventricular fibrillation. The absence of ventricular fibrillation was attributed to the routine use of benodaine, as it was believed that the fibrillation was the result of the presence of an excessive amount of epinephrine when the venae cavae were released at the end of the procedure. The 1 case of fibrillation was that of the 1 dog that did not receive benodaine.

Only 1 dog of 10 died postoperatively, whereas in Bigelow's series 70 per cent of the dogs died in shock postoperatively. The authors attributed their success to the fact that the venae cavae were occluded for only 12 rather than 15 minutes. Aside from the 2 deaths in this series of 11 cases, 2 animals showed some evidence of brain damage after the procedure. One of these had difficulty on the seventh postoperative day and walked in clockwise circles with a stamping gait, bumping into objects as if it were blind. However, this appeared to clear. Another animal showed some evidence of transient neurologic damage. These symptoms cleared in 2 days and the animal, except for being lazy, appeared to be normal.

Using their standard procedure, the authors then carried out 16 more experiments: 8 cardiotomies on the right ventricle with 1 death and 8 cardiotomies on the right auricle with 1 death. Both deaths occurred many hours after the operations, one being the result of gross hemorrhage and the other unexplained.

The next step was an attempt to work at an even lower temperature. Five experiments were done on dogs with temperatures maintained at 17° C. At this lower temperature, it was found that the heart rate would drop from approximately 30 beats per minute to 5 or 6 per minute. This was usually accompanied by a change from sinus to nodal rhythm. It was discovered, however, that 100 mgm. of WIN 2173, when given intravenously, would bring the heart rate back to normal (approximately 30 beats per minute) which permitted the experiment to be done satisfactorily. Two animals survived this experiment and were apparently normal, 1 animal was killed accidently, and 2 animals died of ventricular fibrillation.

One further experiment was carried out in which the heart and lungs of the animal were removed and successfully replaced by a heart and lungs from another dog. Both animals had been cooled to 24° C. before the operation. The transfer was made in 15 minutes. In 3 similar experiments, 1 animal survived for 6 hours after the substitution and had a normal electrocardiogram, return of reflexes, and spontaneous respiration.

The authors then attempt to apply the rule that they had formulated for hypothermia in the animal to man and assume that it should be safe to occlude both venae cavae in man for 9 minutes at

26° C. They conclude that their method should be applicable, particularly in the surgical management of defects of the auricular and ventricular septa. JOHN H. DAVIS, M.D.

Pericarditis. GEORGE R. HERRMANN, ERNESTO J. MARCHAND, GEORGEANNA H. GREER, MILTON R. HEJTMANCIK, and Others. *Am. Heart J.*, 1952, 43: 641.

Although bacterial pericarditis including the tuberculous type has decreased in incidence during recent years, pericarditis secondary to cardiovascular disease, uremia, and malignancy has increased with the life span of the population. A comparison of autopsy and clinical studies suggests that pericarditis is a frequently overlooked condition.

A review of 130 cases of pericarditis collected between 1946 and 1950 at the University of Texas Hospitals showed that pyogenic organisms and uremia were the most frequent causes. Malaise, fever, cough, dyspnea, orthopnea, and pain were the principal symptoms. Most significant of the physical signs was the pericardial friction rub, but diastolic pulmonic shock and accentuated pulmonic second sound with suppression of the heart sounds was usual. Bulging of the precordium or distention of the neck veins may be noted. Auxiliary data may be obtained by fluoroscopy, teleradiography, kymography, electrokymography, and electrocardiography. The latter method is discussed in detail with illustrative graphs. Conclusions as to treatment are concisely presented. THOMAS LANE STOKES, M.D.

The Significance of Pulmonary Hypertension in Constrictive Pericarditis. J. CORDON SCANNELL, GORDON S. MYERS, and ALLAN L. FRIEDLICH. *Surgery*, 1952, 32: 184.

Pulmonary hypertension was found to be an important factor in cardiac catheterization studies in a series of 5 patients with constrictive pericarditis. The latter was associated with an elevated pulmonary capillary pressure which approached that of the pulmonary venous pressure. High pulmonary venous pressure was indicative of obstructive interference with diastolic filling of the left side of the heart due to the constricting pericardium. Pulmonary hypertension persisting after pericardiectomy can be accounted for on the basis of residual scar tissue or of myocardial failure. Constriction of the pulmonary veins did not seem to be a causative factor. On the basis of surgical physiology, good results in constrictive pericarditis can be obtained only by the liberation of both ventricles.

A second significant finding in constrictive pericarditis was the elevation of the right ventricular end-diastolic, right atrial, and peripheral venous pressures, all of which were practically equal. The following rather characteristic curve was described: an early diastolic fall of the right ventricular pressure and then a sharp rise to an elevated end-diastolic pressure which was maintained thereafter on a plateau throughout the balance of diastole. After pericardiolysis the plateau usually disappeared. A third heart sound heard in this disease was thought to be due to the sudden filling of the ventricle early in diastole. B. G. P. SHAFIROFF, M.D.

Case of Double Aortic Arch Treated Surgically. A. L. D'ABREU, ROY ASTLEY, and ALAN PARKES. *Brit. J. Surg.*, 1952, 40: 70.

This is a presentation of a somewhat equivocal case of double aortic arch, although this condition is most probable. The symptoms are discussed. They are primarily due to compression by the vascular ring of the trachea, the esophagus, or of both. Recurrent pneumonias may dominate the picture.

The classification that is used by Gross and Ware concerning anomalies of the great vessels and aortic arch is presented.

The patient in the case was approximately 6 months of age at the time of surgery. A Ramstedt procedure had been done previously for hypertrophic pyloric stenosis with improvement of nutrition, but there were still bouts of coughing with meals. A diagnosis of vascular ring was made roentgenographically and angiocardiography was planned. The infant's condition deteriorated and necessitated prompt operation. At operation an apparently normal aortic arch with primary branches was found. Dissection posteriorly revealed a rather large vessel coursing posteriorly to the esophagus; clamping this vessel made no difference in the pulse in either upper extremity. The vessel was divided with complete relief of the symptoms.

The authors discuss the development of the aortic arch. The roentgenographic appearance is stressed because the diagnosis can be made thereby, and in this case further substantiated the diagnosis of this condition. Double aortic arch must be differentiated from a vascular ring formed by a posterior aortic arch on the right side and the ligamentum arteriosum, and an anomalous subclavian artery on the right side. In the former instance the posterior impression on the esophagus is large, while in double aortic arch it is about half the expected size. The defect produced by an anomalous right subclavian artery is at a higher level than that in the case of double aortic arch.

RICHARD LAWTON, M.D.

Studies in Aortic Autografts and Homografts. Do Homografts Survive? HARRY G. PARSONS, FRANK GERBODE, and ALVIN J. COX. *Angiology*, 1952, 3: 306.

Since experience with most homografts suggests eventual destruction and replacement of the graft, it seems probable that vessel transplants serve merely to restore and maintain mechanical function and provide bridgework for ingrowth of tissue from the host. To determine the survival of arterial grafts, 35 homogenous and autogenous grafts were variously placed in defects of the great vessels of dogs. The

transplants were thoroughly examined microscopically after the dogs were sacrificed.

The presence of normal-appearing muscle cells in the media was the criterion of survival of the grafts. Only 1 of 11 homografts studied 2 weeks or more after implantation showed evidence of survival of the smooth muscle cells. The aortic homografts were converted into an endothelial-lined, blood-conducting tube. The intima was thickened, the smooth muscle cells of the media disappeared, and the elastic fibers became lumped, fragmented, and irregularly stained. Frequently there were areas of calcification in the hyalinized media. The adventitia was fibrosed and contained some round cells.

THOMAS LANE STOKES, M.D.

The Temporary Use of Polyethylene Shunts in the Resection and Homologous Graft Replacement of the Aortic Arch in the Dog. CREIGHTON A. HARDIN, THEODORE L. BATCHELDER, and PAUL W. SCHAFER. *Surgery*, 1952, 32: 219.

Resection of the aortic arch or subdivisions thereof were made possible experimentally by the temporary use of polyethylene shunts for diversion of the blood.

In the first series of this experiment the entire aortic arch was resected in 11 of the dogs. In the process of mobilization of the arch, the pericardial, pleural, and fascial attachments of the aorta were cut. In addition it was found necessary to ligate and cut 4 or 5 pairs of intercostal arteries. Three polyethylene tubes were inserted into the base of the aorta distal to its valve while the opposite ends of the tubes were inserted into each of the innominate arteries and the descending aorta. After the resection, an homologous frozen aortic arch was resutured in situ and the shunts were removed. Two of the 11 animals survived this operative procedure. One dog survived for a period of 10 days and another for a period of 42 days. The average time of aortic occlusion was 73 minutes. The ratio of aorta to shunt was 9 to 1. Death was due to cardiac embarrassment associated with arrhythmia and dilatation of the heart. When the aorta was cross-clamped and the shunts were functioning there occurred a marked and significant rise in blood pressure. Partial occlusion of the inferior vena cava tended to restore the pressure to a normal level.

In a second group of 14 dogs the left half of the aortic arch and the left innominate artery were resected. A shunt was established between the ascending portion and mid-portion of the descending aorta. An homologous frozen graft of the aortic arch and the innominate artery was used to replace the resected tissue. Ten dogs failed to survive this operation. Four dogs survived 8, 12, 18, and 18 days respectively. Electrocardiograms indicated ventricular strain patterns, terminal ventricular tachycardia, or fibrillation. The average duration of occlusion in this experiment was 39 minutes.

B. G. P. SHAFIROFF, M.D.

The Importance of Patent Ductus Arteriosus in Infants. ROBERT F. ZIEGLER. *Am. Heart J.*, 1952, 43: 553.

It is a popular concept that a diagnosis of patent ductus arteriosus cannot be made with certainty in children under the age of 3 to 5 years and, moreover, that surgery should be delayed until the optimum age range of 5 to 12 years. The author reviews the literature and analyzes an additional 22 cases to show that an accurate diagnosis can be made during infancy and that surgical intervention is often life-saving.

Abbott reported 20 deaths among 92 infants with patent ductus arteriosus (25%). Of the author's 22 patients, 8 were 1 year of age or younger, the overall range being 6 weeks to 3 years. The data on these patients is carefully correlated and presented in concise tables affording several interesting observations.

The characteristic continuous murmur of the patent ductus appeared as early as the sixth week rather than at an age between 3 and 5 years as is generally supposed, and was invariably present by the eighteenth month unless it was complicated by pulmonary hypertension.

Among the laboratory aids in the differential diagnosis the roentgenogram and electrocardiogram are of major importance. There is no pathognomonic roentgenographic pattern for patent ductus arteriosus but a merely presumptive diagnosis may be made if there is (1) ventricular enlargement on the left side, (2) auricular enlargement on the left side, (3) increased pulmonary vascularity, and (4) increased amplitude of the pulsations of the pulmonary artery, aorta, and left ventricle. The determination of the heart size is not only a diagnostic aid but has important prognostic and therapeutic implications.

Among the 22 patients with uncomplicated patent ductus arteriosus there were 2 deaths, 1 due to congestive heart failure prior to operation and 1 due to cardiac arrest during the induction of anesthesia. Twenty infants underwent suture ligation of the patent ductus without mortality and recovered uneventfully.

THOMAS LANE STOKES, M.D.

MISCELLANEOUS

Recovery of Pulmonary Function After Crushing Injuries of the Chest. NATHAN KENNETH JENSEN. *Dis. Chest*, 1952, 22: 319.

Nonpenetrating contusions of the chest are best termed "crushing injuries." There are two varieties: (1) those that produce only impairment of motion, and (2) those that produce instability of the chest wall. By the use of the technique of differential bronchospirometry, Wood demonstrated that after fracture of a single rib without parenchymal or pleural damage, there is little reduction in tidal air on the injured side, but there is marked reduction in oxygen absorption. Another sequela of a crushing injury of the chest, with or without rib fracture, is severe pulmonary edema. Painful splinting of the intercostal musculature is

a result of contusion of the chest. The splinting is accompanied by reduced ventilation of the lung. Reduction in circulation through the lung is brought about by closure of the vascular bed surrounding the poorly ventilated alveoli. This results in pulmonary hypertension with transudation of fluid from the circulatory system into the lung.

Multiple rib fractures, common in crushing injuries to the chest, result in a flail chest and "paradoxical respiration." The thorax appears to swing toward the intact side on inspiration and toward the unstable side on expiration. As a result, air is exchanged between the lungs instead of being moved in and out of the trachea. In this manner, alveolar ventilation is greatly reduced. Hypoxia is the result of failing ventilation, and the situation is further complicated by the occurrence of pulmonary hypertension and edema.

A common complication of the crushing injury of the chest is suppression of coughing. This permits bronchial secretions, including clots, to collect. Complete bronchial obstruction from retained secretions and clots may rapidly occur.

The treatment of contusion of the chest without multiple rib fractures consists of the maintenance of a good airway and partial immobilization of the chest wall by circumferential bandaging or adhesive strapping. Oxygen therapy, either by the use of a tent or a nasal catheter, should be instituted to decrease the patient's ventilative requirements. Sedation must be applied with extreme caution because of the tendency to lose pulmonary function by creeping atelectasis which does not become apparent until the patient's vital capacity is markedly decreased.

The maintenance of an adequate airway by the use of catheter suction is extremely effective in establishing an adequate pulmonary ventilation. The author mentions several other complications of contusion of the chest; for example, delayed pleural effusion, which frequently occurs several days or a week after injury; spontaneous pneumothorax, which may occur during the first 10 days or 2 weeks after injury; and myocardial bruising, which may occur any time after injury and cause death.

Perhaps the best treatment of these patients is to maintain an adequate oxygen supply at all times during the initial injury and recovery phases.

The sternum may become flail from fracture of the costochondral junctions of the ribs, fracture across the body of the sternum itself, or from fracture at both of these places. When this occurs, the front of the chest becomes flail and is sucked far in on inspiration, and bulged forward on expiration, which results in a decreased ventilative capacity.

The author points out that unilateral multiple rib fractures, especially in young people, can be managed adequately by circumferential strapping of the chest. This type of strapping stops all costal respiration and adequate ventilation is dependent on diaphragmatic movement. It should be limited to young people who have good respiratory reserve. If the injury is high, sufficient immobilization can be obtained by circumferential strapping around the shoulder opposite the injury. This permits free movement of the uninjured side for respiration. The treatment of an anterior flail chest usually can be accomplished by applying tongs to the sternum and adding 4 or 5 pounds of traction. This gives immediate relief to an anterior flail chest and permits good ventilation.

Lateral chest wall instability is more difficult to treat as it is not adequately managed by the use of traction. The author has found the best solution to be a tracheotomy with the insertion of a specially modified tracheotomy tube. Emergency treatment of lateral chest wall instabilities can be accomplished either by the use of an endotracheal tube with positive pressure oxygen, or a tightly fitting face mask of the positive pressure variety. Since these cannot be tolerated for a long period of time, the specially modified tracheotomy tube, discussed in the article, was designed. The principle of this modified tube is to provide an intratracheal pressure which never falls below atmospheric pressure on inspiration and which will rise 4 cm. of water above atmospheric pressure on expiration.

Several interesting cases, with roentgenograms, are presented as examples of the various types of injury described. JOHN H. DAVIS, M.D.

Diaphragmatic Hernia (A propos de la hernie diaphragmatique). NUBOER. *Acta chir. belg.*, 1952, 44: 420.

Congenital diaphragmatic hernia occurs more frequently on the left side and almost always in typical locations such as the pericardioperitoneal cleft, the pleuroperitoneal cleft, the esophageal orifice, the site of entrance of the sympathetic nerve, and the atypical orifices of the diaphragm.

Acquired diaphragmatic hernia is caused by trauma, inflammatory processes, or by relaxation of the diaphragm. Hernia due to relaxation of the diaphragm may also be of congenital origin.

Congenital hernias are due to developmental anomalies. They may produce no symptoms but in most of the patients there will be symptoms due to prolapse of the abdominal organs, thoracic organs, or of the diaphragm itself. The disturbances thus produced are described. Diagnosis of diaphragmatic hernia is not difficult with use of the barium meal and roentgenography.

Operative treatment may be conducted via the thoracic or abdominal route, the author preferring the former. The abdominal route was employed in only 1 case of hernia of the pericardioperitoneal cleft in which it was uncertain whether the opening was on the left or right side. The hernia discovered in the cleft of Larrey was easily closed. In a series of 11 cases, 8 hernias were located on the left side, 3 on the right side, 6 were in males, and 5 in females; the age incidence ranged from 1½ to 37 years. A sac was discovered in 2 cases.

Hernia of the esophageal orifice is found more frequently than the other types. In the present series there were 82 cases, including 76 cases in adults and 2 cases of congenital short esophagus in infants. Hernia of the hiatus in an esophagus of normal length normally fixed to the diaphragm, the paraesophageal diaphragmatic hernia, and true esophageal diaphragmatic hernia are frequently difficult to differentiate before operation. They are usually not congenital. In this series of 76 cases, only 6 patients were under 40 years of age. Probably degeneration of the muscular tissues plays an important part, as well as increased intra-abdominal pressure and diseases complicated by cough, vomiting, or forced movements. Also pregnancy may be a contributing factor, accounting for the higher incidence in females; in this series there were 50 females to 26 males.

The symptoms in hernia of the esophageal hiatus included gastrointestinal disturbances in 59 cases, with peptic esophagitis or esophageal ulcer in 13, cardiovascular symptoms in 11 cases, and hemorrhages in 6 cases. In the latter group anemia develops. Disorders of deglutition are common. Differential diagnosis will therefore include diseases of the stomach and intestines, diseases of the cardiovascular system, and other conditions producing hemorrhage. The hernia of the esophageal hiatus may be diagnosed roentgenographically in from 8 to 9 per cent of the cases. The degree of evagination does not determine the severity of the symptoms.

Disturbances of deglutition were noted in 4 of the 6 cases of congenitally short esophagus, and hemorrhages in 2. The patients' ages ranged from 10 months to 14 years. A short esophagus in adults is not necessarily congenital but may be due to inflammatory processes. Diagnosis of hernia of the hiatus is possible only with x-rays. Treatment varies according to the type of hernia, the age of the patient, and the severity of the symptoms and complications.

In simple cases, conservative measures may suffice to relieve the symptoms—frequent small meals, avoidance of gas-forming foods, weight reduction, and rest for some hours after eating. If this treatment fails, surgery must be recommended, especially in cases with symptoms of esophageal ulcer or hemorrhage. If operation is not performed promptly, further cicatrization may render correction without resection of the esophagus impossible.

As mentioned previously, the thoracic route seems preferable, except in patients more than 70 years of age or those having a very rigid or deformed thorax. At operation the esophagus is drawn out of the mediastinum and the margins of the diaphragm in the hiatus are liberated. The stomach is then returned to the abdominal cavity through a small opening in the diaphragm. The hiatus is reduced by suture of the pillars behind the esophagus. Finally, the small incision in the diaphragm is closed. This procedure usually yields excellent results. Only 1 patient died, a woman of 60 years who succumbed to pneumonia following thoracotomy. Another patient died 30 days after operation from cardiac infarct. No recurrences were reported, the only disagreeable sequel being persistent intercostal pain which was observed especially after rib resection. Recently the incision has been made in the seventh intercostal space on the left side.

The thoracic route of operation is recommended also in congenitally short esophagus. In cases of esophagitis, stenoses of the lower portion of the esophagus may develop, requiring dilatation over a period of months. The cardia had to be resected in only 2 cases because of impermeable cicatricial stenosis.

EDITH SCHANCHE MOORE.

SURGERY OF THE ABDOMEN

GASTROINTESTINAL TRACT

Surgery of Peptic Ulceration. SIR HENEAGE OGILVIE. *Brit. M. J.*, 1952, 2: 299.

The author stated that in gastric ulcer the cause of origin is unknown, but the cause of persistence is in the stomach itself; in duodenal ulcer, the cause of origin and of persistence is in the patient—his psychological makeup, his job, his habits, and in the reaction of each upon the others. Therefore, in gastric ulcer medical treatment should be abandoned as soon as it is clear that it has not produced permanent healing, but in duodenal ulcer medical treatment should be persisted in until it is clear that it cannot succeed.

The distinction between a benign and a malignant gastric ulcer cannot be made on clinical or roentgenological evidence. The only safe course is to advise gastrectomy in all gastric ulcers that are not rapidly and permanently healed by rest and diet. The failures of gastric surgery all occur after operation for duodenal ulcer. Perforation cannot be anticipated; in many cases the ulcers that perforate are acute with no previous history. However, stenosis can be anticipated, and if in a long standing ulcer there is roentgenological proof of delay in emptying or of failure in gastric tone at a time when the ulcer is clinically quiescent, it is wiser to anticipate the inevitable by operating before the patient has started to lose weight and strength. A single major hemorrhage, that is, one in which 2 or more pints of blood have been lost within an hour or so, is an absolute indication for operation in a man of 50 years or over with a known duodenal ulcer, but lesser hemorrhages in younger men, if they have been repeated more than twice within 2 years, call for surgery.

Vagotomy is unsound as any procedure based chiefly on animal experiments is apt to be unsound. It is unsound in that it cuts out the nervous secretion of acid, which is harmless because it is produced in response to the sight and taste of food and is therefore buffered by food, while it leaves the hormonal secretion untouched. It is still unknown whether the unwanted secretion of acid, which is so characteristic of the ulcer diathesis, is vagal or hormonal in origin, but most stress diseases are characterized by hormone overaction. Vagal section cuts out early acid secretion, but it also cuts out gastric motility, and in most cases some form of short circuit is necessary to overcome the resultant stasis.

Gastrectomy is at present the operation of choice for the treatment of peptic ulceration, whether gastric or duodenal. Gastrectomy, properly planned and executed, lowers the acid secretion to a safe level without abolishing it and restricts this secretion to the time that the meal is in the stomach; it thus retains gastric secretion but abolishes the risk of re-ulceration. A gastrectomy for the treatment of peptic ulceration must satisfy 5 criteria:

1. The whole of the pyloric mucous membrane must be removed to abolish hormonal secretion, the chief factor in primary and recurrent ulceration.
2. The body of the stomach, carrying the highly convoluted areas of acid-forming mucous membrane, must be removed, but enough stomach should be left to make a cavity that will contain a pint—a test it will often be called upon to perform when the enjoyment of life returns.
3. The perigastric tissues on the lesser curve, but not necessarily the muscle coats, must be divided at the level of the cardia in order to divide the leash of vagal branches that spray along the lesser curve, and in order to release the stomach from the tethering of the left gastric artery and to give to the reduced cavity that free motility which all functioning organs should possess.
4. The stoma should not exceed the size of a 2 shilling piece, that of the normal jejunum when fully distended.
5. The stoma should be so arranged that the meal, on leaving the stomach, can pass in an onward direction only.

ROBERT TURELL, M.D.

The Surgical Treatment of Perforated Gastroduodenal Ulcer (Il trattamento chirurgico dell'ulcera gastro-duodenale perforata). ANGELO ACQUATI. *Gior. ital. chir.*, 1952, 8: 322.

The author reviews the literature and gives statistics pertaining to the various methods employed for the treatment of perforated peptic ulcer. Simple closure, simple closure plus gastroenterostomy, immediate gastric resection in early cases, and continuous suction without operation are the methods employed.

At the Monza Hospital the author reviewed 146 cases. Simple suture plus gastroenterostomy was used in 57 cases with a mortality of 19.2 per cent. Among 89 cases treated with simple closure the over-all mortality was 11.2 per cent. In the past 4 years all 47 patients were treated by simple closure and only 1 patient died, or 2.1 per cent. This patient was brought to the hospital 3 days after the onset of the perforation.

The author does not practice immediate gastric resection as he believes that it would result in a higher mortality than simple closure plus gastroenterostomy.

In conclusion, the author believes that perforated gastroduodenal ulcer should be treated with simple closure as it gives the best immediate results. This should be followed in about 3 months by resection, in an attempt to cure the ulcer.

L. J. FRONDUTI, M.D.

Contribution to the Study of Reticulum Cell Sarcoma of the Stomach (Contributo allo studio del reticolo sarcoma dello stomaco). L. GURGIAN CECCONI and A. PIERAZZINI. *Tumori*, Milano, 1952, 38: 134.

In 1893 Kundrat isolated from pseudoleucemia, also called "aleucemic lymphoma," an entity which he termed "lymphosarcomatosis." In 1928 Ewing and also Oberling identified in the last mentioned group the so-called reticulum cell sarcoma. There still is some dispute as to the classification of these neoplasms.

The author reports a case of reticulum cell sarcoma observed in a man 40 years of age. The chief complaints were heartburn and pain in the epigastrium, independent from meals. Roentgenograms revealed a well circumscribed defect on the major curvature of the stomach in the region of the antrum. Exploration elsewhere disclosed a tumor adherent to the omentum and infiltration of the lymph glands along the lesser curvature. A few months later a total gastrectomy was performed. Two weeks after the operation the patient was in good condition. JOSEPH K. NARAT, M.D.

Gastropleural Fistula: Review of the Literature with a Report of a Case Due to Reticulosarcoma of the Stomach. J. W. LAWS. *Gastroenterology*, 1952, 21: 351.

The author presents a case of gastropleural fistula occurring in an adult male with a reticulosarcoma of the stomach. The onset of a left pleural effusion was followed by tension pneumothorax with gastric contents in the effusion. Death resulted from pneumonia of the right lung during the course of repeated aspirations and treatment. Autopsy revealed the presence of a reticulosarcoma of the cardiac end of the stomach with a fistula extending from it through the diaphragm into the left pleural cavity.

Twenty-six cases of gastropleural fistula have been previously described. Eighteen of these developed as complications of perforated gastric ulcers, 5 were complications of posttraumatic diaphragmatic hernias, 2 resulted from gunshot wounds, and 1 case resulted from rupture of a hydatid cyst of the lung.

DONALD C. GEIST, M.D.

Schellong's Test of Circulatory Regulation and the Amount of Circulating Blood in Patients Undergoing Gastric Resection (Kreislaufregulationspruefungen nach Schellong (RP.) und zirkulierende Blutmenge bei Magenresektionen). H. E. POSTH and H. STEINFORTH. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 271: 556.

A slight impairment of the circulation leads to an increase of blood volume, while a grave one causes a diminution of it. A decrease of less than 500 c.c. of blood is of no pathognomonic value.

Schellong's test of the regulatory mechanism of the circulation is based on electrocardiograms and records of the pulse and blood pressure before and after certain physical exercises.

In 50 patients with gastric or duodenal ulcers, Schellong's test was performed before gastric resection and the blood volume was determined before and after the operation in order to appraise the intensity of shock, if any, and also in order to establish the relations between the blood volume and the regulatory mechanism of the circulation.

Relatively small blood losses were recorded in approximately 50 per cent of the patients in whom Schellong's test showed normal conditions. An increase of the circulating blood volume was found in the group of borderline cases, as determined by Schellong's test. Blood losses greater than in normal cases were recorded in 50 per cent of the patients in whom Schellong's test was abnormal.

Schellong's test is of limited value for the prognosis because apparently no definite relations exist between its results and the blood volume. Abnormal results of the test do not necessarily indicate a great operative risk. On the other hand, no patient in whom the test showed a normal result developed postoperative circulatory disturbances.

JOSEPH K. NARAT, M.D.

Hypoglycemic Studies in the Gastrectomized Patient: Examination of the Variations in the Glycemia Following the Ingestion of Fats (Recherches zur l'hypoglycémie des gastrectomisés: étude des variations glycémiques après ingestion de graisses). HENRI MONGES, ANDRÉ MONGES, CH. GUIGOU, and PH. BOUILLIN. *Arch. mal. app. digest.*, Par., 1952, 41: 496.

Seventeen nongastrectomized patients were given oral dosages (40 to 50 c.c.) of crude olive oil. Thirteen nongastrectomized patients (some identical with the above) were given the same amounts of the oil directly into the duodenum by means of a duodenal tube. Finally, 17 gastrectomized patients were administered like amounts of the oil orally.

The oral administration of this oil did not result in any very constant or very notable diminution in the blood sugar, in the nongastrectomized patients. In the same patients the direct introduction of the oil into the duodenum produced a constant and manifest lowering of the titer of the blood sugar. This difference in the behavior of the blood sugar in response to the administration of the fatty substance is ascribed by the authors to the slow transference of the oil from the stomach into the duodenum (physiologic inhibition of the process of evacuation) with oral administration.

Of the 17 gastrectomized patients, one-third (approximately) did not evidence a notable modification of the blood sugar titer. On the other hand, the remaining two-thirds showed a fall in the blood sugar which was at times quite remarkable for its importance and its persistence. Here again the authors tentatively attribute this fall to the rapid and massive passage of the oil into the intestine.

While the authors do not wish to appear too positive with reference to the pathogenesis, they suggest the possibility that the oil provokes the liberation of

a duodenal hypoglycemizing hormone, as postulated by Barre (*Sécrétin*, 1936, 1: Masson, ed.), for a number of substances (acid chyme, alcohol, ether, fats, and soaps) introduced into the duodenum.

It is known, of course, that the upper part of the jejunum possesses the same hormonal properties as the duodenum; nevertheless, the more marked fall in blood sugar in the gastrectomized patient with the introduction of the oil into the jejunum than in the nongastrectomized individual is not entirely explained by the above theory, and the authors suggest, in addition, the previously affirmed evidence of the increased sensibility to insulin and the glycemic instability of the gastrectomized patient.

The authors' studies are being continued and they hope eventually to adduce some useful dietetic conclusions. It would certainly be interesting to know if the regimen rich in fats and poor in carbohydrates, as proposed by Abraham and Gilbert, and by Dunlop, for combating the hypoglycemia secondary to hyperglycemia alimentation, is justified.

In the subsequent discussion the authors answer the question of CH. DEPRAY, as to whether the diminution of the glycemic titer in their patients is paralleled by corresponding clinical signs, by stating that the postprandial troubles of their patients have not been very characteristic on the whole; in only 2 of these subjects were important symptoms noted (headache, vertigo, lipothymia), and these symptoms occurred at the moment after the ingestion of the oil when the glycemic titer was at its lowest point. JOHN W. BRENNAN, M.D.

Replacing the Stomach After Total Gastrectomy with the Right Ileocolon. ARTHUR J. HUNNICUTT. *Arch. Surg.*, 1952, 65: 1.

In the operation of total gastrectomy the advantages of replacement of the stomach with the terminal ileum and right colon are: (1) the ileocecal valve prevents regurgitation into the esophagus, (2) the transplanted right colon will accept an average-sized meal, (3) there are no apparent sensitivities of the right colon to ingested food, and (4) interposing the ileocolon between the esophagus and the duodenum with the resultant admixture of mucous to the ingested food prevents or decreases adverse effects on the jejunum.

Seven cases of total gastrectomy are presented in which the stomach was replaced by the right ileocolon. One case had a 27 month follow-up.

The operation consists in total gastrectomy, after which the terminal ileum is transected about 4 inches (10 cm.) from the ileocecal junction. The right colon is transected at or near the hepatic flexure, in accord with the site of the variable right colic artery. The continuity of the bowel is restored by an ileotransverse colostomy, anterior to the isolated right ileocolic mesentery. The right ileocolon and its mesentery when rotated superiorly will lie over the pancreas. An end-to-end anastomosis is then performed between the esophagus and the terminal 4 inches of the ileum and between the transected hepatic colon and the duodenum. STEPHEN A. ZIEMAN, M.D.

Functional Intestinal Obstruction Without an Obvious Antecedent Cause. VICTOR BONNEY. *Brit. J. Surg.*, 1952, 40: 78.

The author has had considerable experience with paralytic ileus, and here presents a case to substantiate his theory as to its causation. In the past, patients have been subjected to abdominal exploration for intestinal obstruction, at which time engorged mesenteric vessels and distended purplish red bowel distended with gas and heavy with fluid were found. The upper portions of the ileum and jejunum were usually involved. These appearances are thought to represent neurovascular response, the initiating factor in many instances being attributed to diseases and operative procedures outside of the peritoneal cavity. One case of ileus is cited as occurring after inadvertent ligation of an ovary, and other cases as following prostatectomy, kidney operation, retroperitoneal hemorrhage, and moderately severe trauma.

The author suggests that a common agent in the cause of the condition may be a substance resulting from tissue breakdown, particularly in partially devitalized tissues. This toxic substance could then act on the neurovascular mechanism in or behind the mesentery.

A case with the signs and symptoms of progressive ileus is presented. At operation, mesenteric engorgement and distention of the jejunum with gas and fluid were found. The abdomen was closed and gastric suction instituted. The patient recovered promptly. The author mentions several other cases; 2 occurred during pregnancy, but, he thought, they were not related to the pregnancy. Two additional cases, reported by others, followed the administration of hexamethonium. Both of these were fatal. RICHARD LAWTON, M.D.

Results of Treatment of Duodenal Ulcer with Vagus Resection and Gastroenterostomy. S. O. HOERR, C. H. BROWN, E. W. RUMSEY, and G. CRILE, JR. *J. Am. M. Ass.*, 1952, 149: 1437.

The authors report the results of their treatment of a series of duodenal ulcer patients by vagotomy and gastroenterostomy. One hundred and forty-seven patients so treated have been followed from 2 to 4 years. The study is based on the hospital records and results of a follow-up questionnaire sent to each patient. Seventy-eight patients were followed for 2 years, 53 patients were followed for 3 years, and 16 for 4 years postoperatively. One-half of the patients were under 50 years of age.

The indications for surgery in this group of patients were the usually accepted ones of intractability, obstruction, hemorrhage, and the danger of malignancy. A subdiaphragmatic vagotomy and a short loop posterior gastroenterostomy were done.

An excellent result means no gastrointestinal complaints, no medicaments, no diet, regular occupa-

tion, and complete satisfaction with the result on the part of the patient. One hundred and one, or 69 per cent of the patients, have excellent results. A good result implies occasional vague digestive complaints, but otherwise the patient is well. Adding the excellent and good results gave 132 (90%) of the patients a successful outcome. Ten patients had a poor result. Six of these had proved marginal ulcers, 4 required re-operation, and 4 were corrected by a medical regimen.

The authors believe that vagotomy and posterior gastroenterostomy offer good results in the treatment of duodenal ulcer. They do not advocate the procedure for gastric ulcer, for patients in whom a certain ulcer is not found at operation, or for emergency care of acute active hemorrhage.

DONALD C. GEIST, M.D.

Carcinoma of the Duodenum. G. M. LUNN. *Brit. J. Surg.*, 1952, 40: 5.

A consideration of the literature shows that carcinoma of the duodenum is not as rare as it was formerly supposed to be, and is still commonly taught to be. A large series of cases has now been accumulated, mainly by American authors.

This disease is said to account for 0.3 per cent of all intestinal carcinomas, and to be found in 0.035 per cent of autopsies (Kleinerman, Yardumian, and Tamaki, 1950). The figures of Willis (1948) illustrate the relative incidence of carcinoma in various sites. In his autopsy series of tumors there were 227 gastric carcinomas, 190 carcinomas of the large intestine, 42 pancreatic carcinomas, and 17 carcinomas of the small intestine, of which 5 were duodenal. Hoffman and Pack (1937) state that of a series of 228 carcinomas of the small intestine, 104 were in the duodenum.

Duodenal growths are most conveniently classified, according to their relation to the papilla of Vater, as suprapapillary, peripapillary, and infrapapillary.

The symptoms vary, according to the situation and type of the growth. The large proliferative tumors and the tight annular lesions produce duodenal obstruction and vomiting. If such a lesion is above the papilla of Vater there will be no bile in the vomit and the condition will resemble pyloric stenosis, although the overall history will be shorter. If the lesion is in the infrapapillary part the vomit will contain bile, provided there is not coexistent biliary obstruction. Duodenal obstruction may be present without biliary obstruction even when the growth is peripapillary.

As with carcinoma elsewhere in the small intestine, obstruction is a late phenomenon due to the fluid nature of the contents. Jaundice is the chief symptom in peripapillary lesions. Ulceration leads to bleeding, and it may be that the resulting anemia may produce the only symptoms. Pain is a frequent symptom. It may amount to no more than discomfort after meals, or with ampullary growths may resemble biliary colic. A more constant pain felt in the upper abdomen and passing through to the back is a very common symptom in pancreatic carcinoma. Loss of weight is more marked in pancreatic than in duodenal carcinoma, although it will obviously depend on the severity of the vomiting.

Examination of the patient may reveal an enlarged liver and less often an enlarged gallbladder, when there is biliary obstruction. Apart from chemical tests for jaundice, the two investigations of most value are the estimation of occult blood in the stools and a barium meal. In the absence of another known ulcerated lesion the presence of occult blood may help to distinguish a peripapillary from a pancreatic carcinoma. The barium meal is the most valuable single measure of arriving at a correct preoperative diagnosis, provided that the duodenal loop is filled with barium and carefully examined. The final diagnosis rests upon an awareness of the condition and a careful laparotomy aided, if necessary, by mobilizing and opening the duodenum to inspect the interior.

The treatment of choice is a pancreaticoduodenectomy for growths at or near the papilla of Vater, and a segmental resection for the remainder. It will be seen that patients are more comfortable if the pancreatic secretion is returned to the alimentary tract.

Five cases of duodenal carcinoma are reported. All of these patients underwent a radical excision, one including a total pancreatectomy. There was one postoperative death. The remaining patients are well and free from evidence of recurrence 6, 8, 16, and 26 months after operation.

BENJAMIN GOLDMAN, M.D.

Primary Carcinoma of the Third Part of the Duodenum. K. E. ROGERS, F. C. GOLIGHER, and E. ROHAN WILLIAMS. *Brit. J. Surg.*, 1952, 40: 1.

A survey of the literature shows that primary carcinoma of the duodenum accounts for only 0.3 per cent of all gastrointestinal carcinomas; not more that 12 per cent of these growths occur in the third part of the duodenum. The diagnosis of the condition has usually been made at laparotomy or autopsy.

Two cases of primary carcinoma of the third part of the duodenum, correctly diagnosed preoperatively, are reported in this study. The salient features in their symptomatology are discussed and the authors emphasize the value of roentgenologic examination carried out when symptoms are maximal.

Treatment was by resection and end-to-end or side-to-side anastomosis, which was accomplished without difficulty and followed by immediate recovery in both cases. One patient died of recurrence 4 years later; the other is alive and well 1 year after operation.

BENJAMIN GOLDMAN, M.D.

Carcimona of the Third Part of the Duodenum. SIR THOMAS DUNHILL. *Brit. J. Surg.*, 1952, 40: 13.

The rarity of adenocarcinoma of the third portion of the duodenum is attested to by the fact

that a cursory search of the literature revealed only 2 cases, the present author reporting at one time 3 cases. These 3 cases came under the surveillance of the author between the years 1926 and 1934.

The first patient was successfully operated on and lived 21 months following the resection, although node metastases were present at the time of resection. An end-to-end duodenojejunal anastomosis was accomplished. A preliminary gastrojejunostomy was done.

The second patient died the day following surgery and death was attributed to chronic malnutrition plus the trauma of surgery. In this case also a preliminary gastrojejunostomy was done, but it did not function properly. Local resection was done and the gastrointestinal tract re-constituted by an end-to-end duodenojejunostomy.

The third patient entered the hospital with a palpable mass and an acute condition of the abdomen. He was operated on and found to have purulent peritonitis. Death occurred the next day. Autopsy was done in this case and offered opportunity for study of the lesion.

The anatomical diagnosis in the first 2 cases had been somewhat in jeopardy because of the absence of Brunner's glands in the specimen. In case 3, however, in spite of accurate anatomical localization to the duodenum, and in the absence of Brunner's glands, the lesion was assigned to the jejunum. This prompted a study of the normal duodenum, and it was found that beyond the junction of the distal and middle thirds of the duodenum Brunner's glands are unusually scarce.

There are no unusual or characteristic symptoms. Obstruction in the upper gastrointestinal tract is the common denominator. The author's conclusion as regards symptoms stresses a careful x-ray examination of individuals with persistent upper gastrointestinal symptoms.

The technique of operation does not lend itself to standardization at this time. The author successfully utilized end-to-end duodenojejunostomy. Others, in dealing with lesions of the third portion of the duodenum, were prompted to close the duodenum and construct a side-to-end gastrojejunostomy or a side-to-side gastrojejunostomy after closing the jejunal stump. An occasional contraindication to end-to-end anastomosis, it was thought, is the absence of peritoneum in the posterior aspect of the duodenum; however, in the present author's cases this seems not to be true.

RICHARD LAWTON, M.D.

The Pathology of Chronic Stenosing Diverticulitis of the Colon—So-Called Diverticulitic Tumor (Zur Pathologie der chronischen stenosierenden Diverticulitis coli—sog. Diverticulitistumor). A. CELIO. *Helvet. chir. acta*, 1952, 19: 93.

This is a report of a pathologic study of 13 cases of chronic diverticulitis of the sigmoid colon. In 7 of these cases a so-called "diverticulitic tumor" was present. The degree of hypertrophy and hyperplasia of the muscles of the colon wall appears to be in direct ratio to the degree of inflammation present. In 3 cases the peridiverticular inflammation appeared to be of the regional enteritis type. In other cases Auerbach's nerve plexus appeared to be hyperplastic and showed degenerative changes.

In discussing the pathogenesis of the disease the author draws a relationship between the muscular hyperplasia and the chronic irritation of the nerve elements of the intestinal wall. He draws a further parallel between the hyperplasia present in this condition and that of other hypertrophies of the gastrointestinal tract in the pathogenesis of which the nervous system likewise plays a part. Re-emphasis is placed on the importance of the differential diagnosis between a "diverticulitic tumor" and carcinoma since the prognosis depends so much upon the treatment which is instituted after the clinical examination has been made.

HAROLD LAUFMAN, M.D.

Coexistence of Acute Appendicitis and Grave Pulmonary Tuberculosis (Die akute Appendicitis bei schwerer Lungentuberkulose). R. HOPPE. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 272: 263.

According to a prevailing opinion acute appendicitis not infrequently aggravates pre-existing pulmonary tuberculosis. In the author's experience with a large series of cases, the weight of evidence contradicts this statement.

Specific changes are found in from 8 to 30 per cent of appendices removed from tuberculous individuals operatively or at autopsy. Specific lesions of other organs than the digestive tract can be detected in 47 per cent of the cases of tuberculous appendicitis, and the intestines or their glands are affected in from 45 to 90 per cent. Isolated enterogenous infection of the appendix is a great rarity. In the majority of cases tuberculous appendicitis is of hematogenous or lymphogenous origin. While the ulcerative type may closely resemble a nonspecific acute appendicitis, the hypertrophic form cannot be clinically or roentgenologically differentiated from ordinary chronic appendicitis.

In a series of 3,800 tuberculous patients, 90 per cent with open tuberculosis, appendectomy was performed in 14 patients, or 0.36 per cent. The histologic study of the removed specimens disclosed specific lesions in 4 patients and nonspecific appendicitis in 10. In 7 cases the abdominal cavity was drained without the formation of tuberculous fistulas. In 2 cases of nonspecific appendicitis a moderate dissemination of tuberculous lesions throughout the previously unaffected lung from the contralateral lung could be detected after the operation. In the remaining cases no untoward effect of the surgical procedure could be established. In 4 cases the remarkable improvement of the specific lesions, which followed appendectomy, was possibly due to immunobiologic changes.

JOSEPH K. NARAT, M.D.

Treatment of Extensive Prolapse of the Rectum in Aged or Debilitated Patients. W. A. ALTEMEIER, JEROME GIUSEFFI, and PAUL HOXWORTH. *Arch. Surg.*, 1952, 65: 72.

The authors review the various methods of handling prolapse of the rectum. Their article applies particularly to the aged and to those who are poor operative risks. The procedure is of a modified Dunphy's perineal type and is restricted to this approach entirely. It is based on the fact that there is always a herniation of the perineal sac through the anterior wall of the rectum. A circumferential incision converts the prolapse to a single loop of redundant rectum and rectal sigmoid. The excess bowel is removed, and the peritoneal cavity is closed at a higher level above the site of the bowel resection. The defect in the levator ani muscles is repaired with interrupted sutures and the mucous membranes of the divided bowel are attached to the pectinate line.

The operation is performed extraperineally entirely which causes little or no shock to an aged or debilitated patient. Because of these factors it is recommended in younger patients who are better surgical risks. STEPHEN A. ZIEMAN, M.D.

Individual Pathology and Individual Surgery of Rectal Carcinoma (Zur Individualpathologie und Individualchirurgie des Mastdarmkrebses). FRIEDRICH STELZNER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 272: 101.

The author's conclusions are based on observations of 1,500 cases of carcinoma of the rectum. So-called malignograms were drawn to express the degree of malignancy. Great attention was paid not only to the tumor parenchyma but also to the stroma and the structure of the site of the cancer. It is important that all tumors are studied by the same individual and that the duration of the clinical symptoms be taken into consideration. Polyps and precancerous lesions should be treated by local excision.

Contrary to carcinoma of the rectum, so-called carcinoid does not produce inflammatory symptoms such as bleeding or mucous discharge; the ulcer formation is inconspicuous, the pararectal space is invaded only in advanced stages, and the tumor is radiosensitive.

Carcinoma polyposum recti is usually large, globular, or covered with filigreelike formations, has a soft consistency, and remains mobile for a long time.

The great majority of carcinomas of the rectum belong to 2 groups, namely, so-called carcinoma circumvallatum and carcinoma phagedenicum. Both have a hard consistency, smooth surface, contain a pronounced ulcer, and frequently have an elevated border. Gelatinous cancer is a variation of this type and does not form any special group. The phagedenic group is characterized by a large ulcer formation. The loss of tissues is greater than the tumor proper. The majority of such tumors is inoperable.

Anal carcinomas are especially malignant and originate more frequently from the squamous epithelium than from the specific glands.

Multiple biopsies are recommended by the author to prevent an erroneous diagnosis. Malignograms are based not only on the histologic findings but also on the gross appearance of the tumor and the results of the clinical examination.

JOSEPH K. NARAT, M.D.

The Urological Complications of Excision of the Rectum. P. C. WATSON and D. INNES WILLIAMS. *Brit. J. Surg.*, 1952, 40: 19.

The anatomical changes resulting from combined excision of the rectum are described and their effect on the physiology of micturition is considered.

Retention of urine is the commonest complication of combined excision and is caused by a number of contributory factors. Trauma involved in the pelvic dissection is probably important; severe nerve lesions are rare and may be avoidable.

A syndrome is described in the male in which severe retention of urine is succeeded by incontinence of varying severity; 2 cases in a series of 50 undergoing synchronous combined excision and 7 additional cases are reported. The syndrome is attributed to gross pelvic-nerve injury, which is considered to arise in most cases from a failure to divide the fascia of Waldeyer. Recognition of this syndrome is important and should lead to a careful consideration of operative technique. The mechanism of incontinence after pelvic-nerve injury is discussed and related to the changed anatomy.

A careful and rational postoperative management of the bladder is of the greatest importance to the patient's comfort. Prostatectomy need rarely be precipitated by combined excision, and suprapubic cystostomy is best avoided.

Urinary symptoms have commonly to be elicited by direct questioning in patients who have undergone excision of the rectum. Their interpretation is worthwhile, for some symptoms can be prevented and most of them can be relieved.

BENJAMIN GOLDMAN, M.D.

The Association of Chronic Ulcerative Colitis and Carcinoma of the Rectum and Colon. P. BRIAN COUNSELL and CUTHBERT E. DUKES. *Brit. J. Surg.*, 1952, 39: 485.

All carcinomas following chronic ulcerative colitis in this series of 13 cases had two characteristics in common. In the first place the outward appearance of the malignant tumor was unusual, so much so in some cases that the presence of malignancy was unsuspected. Secondly, when carcinoma follows chronic ulcerative colitis it usually grows very rapidly. In nearly all of these cases the tumor was anaplastic in character, having the histology of an undifferentiated colloid carcinoma or an adenocarcinoma of a high grade of malignancy. Also, these growths were exceptionally invasive in character, and had spread intramurally by infiltration within the submucosa and muscle coat, well beyond the visible boundaries of the surface lesion. Lymphatic spread also occurred at an unusually early stage.

In this series of 13 cases of cancer following chronic ulcerative colitis, only one tumor had not given rise to lymphatic metastases, whereas in the cases of other cancers of the rectum and colon operated upon during the same period, approximately half of the lesions showed no lymphatic spread. In cancer following chronic ulcerative colitis, the average number of lymphatic metastases is greater than that for other cancers, and indicates a bad prognosis, which the follow-up records abundantly confirm.

The commonest varieties of pseudopolyps are mucosal tags and inflammatory polyps; these are not to be regarded as precursors of cancer. Adenomatous polyps are much less common but are definitely precancerous; therefore, special care is needed in the supervision of any patient who has had chronic ulcerative colitis and who is known to have adenomatous polyps in the rectum.

The early recognition of precancerous lesions would, of course, improve the results of the surgical treatment of cancer following chronic ulcerative colitis, but in a very small proportion of cases only, because polypoid lesions do not occur in all cases and in only a small proportion of these are adenomatous polyps found. Although cancer following chronic ulcerative colitis may begin as an adenomatous polyp, the authors do not believe that it does in many cases. They are amazed by the fact that carcinoma so frequently develops without any visible or recognizable neoplastic lesion on the surface, and this fact has not been considered sufficiently in the past.

The present study of the clinical history and pathology of 13 cases of cancer of the rectum or colon following chronic ulcerative colitis has led to the following four conclusions:

1. Carcinoma occurs more frequently in patients who have had chronic ulcerative colitis than in those who have not had this disease; chronic ulcerative colitis predisposes to carcinoma.

2. The extent of this predisposition to carcinoma has been underestimated in the past because patients have not been kept under adequate supervision and because of the clinical and pathological difficulties in diagnosis. The percentage of malignancy recorded in any series of cases will vary with the severity of the disease, its duration, the age of the patients, the period of observation, and the experience of the observer.

3. When carcinoma follows chronic ulcerative colitis, it usually grows rapidly and metastasizes early. It may cause no recognizable surface tumor or ulcer, but only a diffuse stricture resulting from intramural spread of carcinoma. Histologically, the growth is usually a colloid or mucus-secreting carcinoma, often of a high grade of malignancy.

4. Carcinoma following chronic ulcerative colitis has a very unfavorable prognosis. This is due to the rapid spread of the tumor and to difficulties in diagnosis. Most patients are already incurable by the time carcinoma has been diagnosed.

ROBERT TURELL, M.D.

The Significance of the Level of the Peritoneal Reflection in the Surgery of Rectal Cancer. M. R. EWING. *Brit. J. Surg.*, 1952, 39: 495.

The author stated that within the past 20 years or so the anatomical nomenclature of the distal colon has been subject to frequent revision, but it still remains rather confused and indefinite. It is certainly true that the practicing proctologist has, for long, been dissatisfied with the anatomy of this area as he finds it in the standard textbooks. Although some of the changes in nomenclature have proved very helpful to the surgeon, they have by no means made for greater accuracy in description, and curious inconsistencies have found their way into surgical writings.

It is obviously one thing for the anatomist to decide, when he has laid bare the rigid intestine in the horizontally disposed cadaver, that the rectum begins opposite the middle piece of the sacrum. However, for the surgeon with a living mobile gut it is quite another matter, and it is by no means easy for him to decide precisely where the colon ends and the rectum begins. Consequently, he has come to talk loosely of a somewhat vague and ill-defined segment of bowel which he calls the "rectosigmoid." He can readily recognize the sigmoid slung from its mesentery as well as the rectum where it passes back into the hollow of the sacrum and gradually loses its peritoneal investment. The rectosigmoid is the "no-man's land" in between. The surgeon's description of the anatomy is based on operative technique rather than on spatial relationship. Technically, removal of a segment of the mobile sigmoid presents one problem and removal of the fixed rectum another and it has been the custom of the surgeon to include the area where the first merges into the second, and where the methods of resection applicable to the sigmoid can no longer be practiced without modification, the rectosigmoid along with the rectum proper.

It is true also from the pathological (especially in cancer) as well as from the operative point of view that the distal part of the colon seems properly to belong to the rectal segment. The author believes that the term rectosigmoid is an unsatisfactory one, often applied loosely to an ill-defined length of bowel much of which may deserve, more correctly, to be called the "sigmoid."

From a consideration of the anatomy of the rectum the author made the following points:

1. One of the easiest landmarks for the surgeon and the pathologist to recognize is the peritoneal reflection.

2. Not only is the peritoneal reflection an easily recognizable landmark but there is evidence that embryologically, morphologically, and possibly functionally, that the rectum above this level is quite distinct from the part below.

3. There is also some evidence that the reflection also marks the position in the normal subject of a very definite lymphatic watershed, the lymph above the level draining only upward, and that below, not

only upward but laterally and downward as well. There is considerable evidence, too, that at least in the earlier stages of the disease, the spread of rectal cancer by the lymph stream is in precisely the same direction.

4. There is evidence that the prognosis following the resection of a tumor below the reflection is much less favorable than that following resection of one lying above. This would be a good reason for employing the very widest resection possible for tumors below the reflection.

5. The most radical resection of extraperitoneal tumors (commonly by combined abdominoperineal resection) is not only justified by pathological argument but also by consideration of the technical problems involved; for example, in any sphincter-saving operation it would be wise to consider the rectum above and the rectum below the peritoneal reflection as being fundamentally distinct.

ROBERT TURELL, M.D.

LIVER, GALLBLADDER, PANCREAS, AND SPLEEN

Hepatic, Splenic, and Left Gastric Arterial Ligations in Advanced Portal Cirrhosis. JACOB K. BERMAN and JAMES E. HULL. *Arch. Surg.*, 1952, 65: 37.

The authors give the case history and results in 12 cases of advanced portal cirrhosis of the liver. The patients did not respond to medical management and their prognosis would have been poor had they been kept on the therapy advanced.

From the 12 cases which were treated by ligation, 3 definite contraindications became apparent. It was learned that the operation should not be done on patients who are actively bleeding unless it be performed within the first 24 hours of the bleeding. Since severe jaundice is usually associated with an enlarged liver, which indicates considerable venous stasis, this symptom was concluded to be a contraindication to surgery.

The combination of severe hypertension with cirrhosis is rare, but it was learned that this constituted another contraindication to surgery. It is emphasized that poor liver function in itself, as determined by the various laboratory tests, must not be considered as a contraindication.

The preoperative preparation for these patients is the same as that for any other type of operation, with particular emphasis on re-establishment of the blood volume. After about a week, surgery is undertaken.

The operative technique consists of a longitudinal or transverse incision which is advanced down to and through the peritoneum. The liver is inspected, and the hepatic artery is felt by palpation through the epiploic foramen, exposed, and divided. The splenic and left gastric arteries are similarly handled through an incision in the hepatogastric ligament, and in obese patients, through a second incision in the gastrocolic ligament. After the vessels have been ligated, a specimen of the liver is taken for biopsy study.

STEPHEN A. ZIEMAN, M.D.

The Time of Appearance of Bromsulphalein in the Bile Obtained with the Duodenal Tube. Its Diagnostic Value (a) in Anicteric Subtotal Obstruction of the Main Bile Duct, and (b) in the Diagnosis of Jaundice with Incomplete Retention of Bile (Le temps d'apparition de la bromesulfonephtaléine dans la bile recueillie par tubage. Sa valeur diagnostique: a, Dans le blocage sub-total anictérique de la voie biliare principale. b, Dans le diagnostic des ictères incomplets par rétention). J. CAROLI, Y. TANASOGLU, and M. COHEN. *Arch. mal. app. digest.*, Par., 1952, 41: 623.

The method of injecting bromsulphalein, of collecting the bile and blood specimens, and estimating the different quantities tested for seems to be pretty much the same in France as that commonly used in America. One difference might be mentioned, that is, the use of the surface area of the body instead of the body weight for determining the dosage of bromsulphalein to be administered (150 mgm. per square meter of body surface).

Some 30 adequately studied patients with various forms of biliary disease have led the authors to three postulations with reference to the bromsulphalein test. The first conclusion arrived at is that this test cannot be applied unless some bile is getting through to the duodenum; the excretion of bile will be at least 1 c.c. per minute. The second conclusion is that the test may be used with satisfactory results in jaundiced patients, as well as in the anicteric types. The third conclusion is that this test may be used to distinguish between occlusions in the main biliary tract (stone in the choledochus, tumors of the papilla of Oddi, stenosis of the choledochus as a result of pancreatitis) and the retentions resulting from lesions of the liver parenchyma (cirrhosis of the liver, icterogenic hepatitis).

In mechanical, partial occlusions of the main duct, the time interval for the appearance of the bromsulphalein in the bile is lengthened; in the hepatic parenchymatous retentions the time of appearance is actually shortened, or, at least, is normal.

In an attempt to explain the odd behavior in the appearance of the bromsulphalein in the 2 types of lesions discussed the authors suggest that in the mechanical occlusion lesions the back pressure of the stagnating bile affects the so-called "biliary" pole of the hepatic cell and this acts on the whole biliary tree within the liver, producing a universal inhibition of secretion. In the parenchymatous retentions, on the other hand, the inhibition at the source is quasi-mechanical. One of the authors of this article has already suggested that in these instances the obstruction takes the form of an obstruction of the canals of Herring at the periphery of the hepatic lobule. When enough of the excretory ducts are plugged the retention of the bromsulphalein in the blood stream occurs; however, that part which gets through then passes in unobstructed fashion to the duodenum. In fact, due to the general empty con-

dition of the biliary tract, this passage to the duodenum may actually be more rapid than normal.

JOHN W. BRENNAN, M.D.

Primary Sarcoma of the Gallbladder (Il sarcoma primitivo della colecisti). VINCENZO ZAFFAGNINI. *Arch. ital. chir.*, 1952, 75: 111.

The author describes a case of sarcoma of the gallbladder in a 54 year old female. The preoperative diagnosis was neoplasm of the gallbladder, based upon the clinical finding of a palpable mass in the right upper quadrant. The gallbladder was not visualized on x-ray study. At operation a large tumor mass involving the gallbladder was found. This was about the size of an infant's head and contained a gelatinous substance. The histological diagnosis was polymorphocellular sarcoma. The patient died after 32 months from widespread metastases.

An extensive review of the literature is presented. The author was able to find a total of 64 cases reported. One of the interesting points brought out was that there was no patient under 30 years of age. In 80 per cent of the cases gall stones were present and in 75 per cent of the cases the patients were women. The sarcoma very often appeared as a large palpable mass with irregular surface, whereas carcinoma does not usually give such a remarkable enlargement of the organ. The recommended therapy is cholecystectomy with partial resection of the liver when possible. Radical surgery was possible in only 21 of the 37 patients operated upon. Of 8 patients of whom the survival time is known 5 died within 2 to 6 months, 1 patient died after 32 months, 1 died after 10 years, and 1 is still alive 10 years after surgery.

LUCIAN J. FRONDUTI, M.D.

Direct Laparoscopic Cholangiography (La colangiografia diretta mediante laparoscopia). A. ALLODI, F. MURATORI, M. BANCHE, and A. VISENDAZ. *Minerva med.*, Tor., 1952, 43: 15.

Lately the diagnostic armamentarium employed in the investigation of the biliary tract, consisting of duodenal drainage and cholecystography, has been enriched by angiography, biliary manometry, and biliary radiomanometry. The last mentioned method requires laparotomy. In 1942 Lee suggested injections of a radiopaque substance into the gallbladder through a laparoscope.

The employment of this method in 7 patients demonstrated its simplicity and efficiency. Laparoscopic cholangiography facilitates anatomic, physiologic, and anatomopathologic studies of the gallbladder and the extrahepatic bile ducts. Stones in the gallbladder and in the cystic, hepatic, or common duct can be visualized. Irregular outlines of the gallbladder suggest an inflammatory process. The diagnosis of a neoplasm can be firmly established.

Contraindications to the use of this method are those to laparoscopy in general, and also the presence of acute cholecystitis. On the other hand, laparoscopic cholangiography may be employed in cases in which a hepatic lesion prevents sufficient elimination of the dye introduced orally or intravenously.

The dye is injected into the gallbladder after preliminary lavage of the organ with saline solution and a mixture of penicillin and streptomycin.

Slight discomfort in the right hypochondrium may be experienced by the patient for a few days following the employment of this method. In 2 patients severe pain of half an hour's duration was attributed to the escape of bile through the site of the puncture of the gallbladder into the peritoneal cavity. Technical errors, adhesions, or interposition of the omentum may prevent visualization of the gallbladder in some cases.

JOSEPH K. NARAT, M.D.

Results of the Operative Treatment of Choledocholithiasis (Eigene Ergebnisse der operativen Behandlung der Choledocholithiasis). R. DEMEL. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 271: 302.

The author reports on 130 patients operated upon for choledocholithiasis, which represent from 16 to 20 per cent of all patients with lithiasis of the biliary system. The material is divided into 3 groups.

The first group of 120 patients was composed of those who had choledocholithotomy as a primary operation in combination with cholecystectomy. Various procedures were performed and the mortality rate is given for each individual technique. The author has abandoned the transduodenal choledocholithotomy with splitting of the papilla of Vater. Since then the overall mortality has improved from 17.6 to 10 per cent.

Group 2 included 3 patients who had cholecystectomy in other hospitals before choledocholithotomy became necessary. All were cured.

In group 3 Demel presents 7 patients in whom recurrences necessitated reoperation. Three patients had their first operation in other hospitals. Two patients of this group died. In 3.2 per cent of the author's material recurrences occurred. They occurred chiefly in patients who were found to have intrahepatic calculi or debris. Cholangiography during and following operation (the economical aspect of which has often prevented this procedure) has decreased the incidence of recurrences. In many cases, however, small calculi may be overlooked or intrahepatic debris cannot be removed sufficiently despite probing and extensive washings. The author recommends careful palpation along a medium-sized metal probe. This method has enabled him frequently to detect small calculi.

In cases in which inflammation of the ducts led to preventive anastomosis over a rubber tube, usually the rubber tube was expelled soon after the operation. However, occasional difficulties led the author to use a catgut string made of several thick catgut sutures. No pressure symptoms were encountered if the anastomosis was prepared over such a string. Of the 83 surviving patients who came for re-examination 82 were free of symptoms. One patient had occasional pain in the right upper quadrant.

KURT BENIRSCHKE, M.D.

Fig. 1, left, and Fig. 2, right (Hepp and D'Allaines). Hepatojejunostomy over a protective drain.

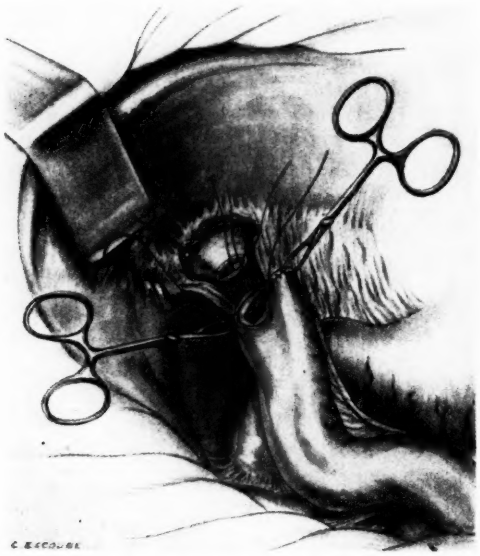


Fig. 3. The loop of jejunum is isolated for a length of 30 cm. and partially closed for anastomosis below the hilus.

Treatment of Cicatricial Stenoses of the Main Biliary Duct by Hepatojejunostomy en Y (Le traitement des sténoses cicatricielles de la voie biliaire principale par l'hépatico-jéjunostomie en Y). JACQUES HEPP and CLAUDE D'ALLAINES. *J. chir.*, Par., 1952, 68: 409.

Stenoses of the main hepatic duct after cholecystectomy are not infrequent and pose difficult therapeutic problems because in most cases they are located at the top portion of the pedicle, at the level of the hilus.

The authors consider hepatojejunostomy en Y as the method of choice among the different proposed operations for derivation of the bile to the intestine. In this article they describe the technique of the intervention in detail, review the literature briefly, and report on 6 cases of their own experience in which the operation was successful.

A paramedian incision is made extending to below the level of the umbilicus. The hepatic duct is isolated and bile is aspirated; this is frequently whitish in color. Cholangiography is done to determine the exact localization of the stenosis. A loop of jejunum is severed about 30 cm. distal to the duodenojejunal angle, and the proximal segment is drawn to a position below the liver. For this purpose it is freed from its mesentery. As the circumference of the jejunum is larger than that of the duct, one-third of the severed end of the gut is closed by suture in two

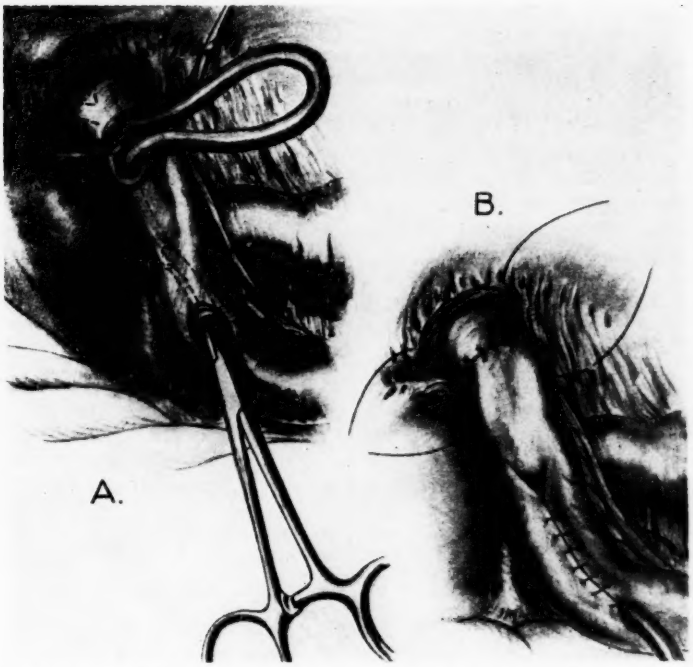


Fig. 4. *A*, The transanastomotic drain is drawn out through an opening in the jejunal loop. *B*, After completion of the anastomosis the jejunal loop is attached to the subhepatic perihilar fibrous tissue. The drain leaves the jejunum under a Witzel tunnel.

planes, and an end-to-end anastomosis with the hepatic duct is done over a drain of rubber or plastic. After completion of the anastomosis this drain is drawn out of the jejunum by means of a small incision one handbreadth below the anastomosis. It may either be left in place or withdrawn at the end of the intervention.

The most difficult are the cases in which the orifice of the duct is invisible because it is imbedded in the liver parenchyma. In these cases it is necessary to prepare a conical tube of jejunal mucosa several centimeters in length and to join it to the orifice after a tunnel has been carved in the liver substance with the electrocautery. In animal experiments it

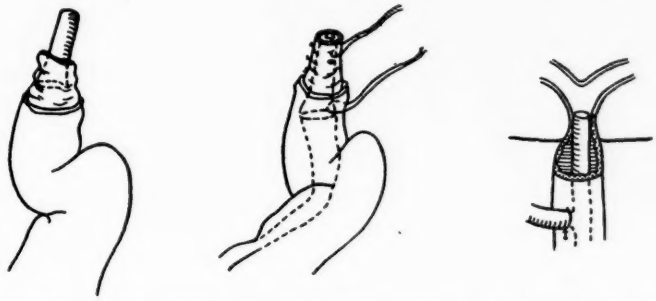


Fig. 5. Preparation of a tube of jejunal mucosa for hepatojejunostomy over a drain (after Cole Reynolds and Ireneus).

has been proved that this tube remained intact and in situ 6 months after the intervention.

The writers recommend leaving the transanastomotic drain in place for a certain time in all cases to prevent secondary postoperative stenoses. In uncomplicated cases the drain remains in place for 3 to 6 weeks; in anastomosis with a cuff of mucosa as described it should be retained for a period of 3 to 6 months. In no case was seepage of bile through the incision observed after removal of the drain.

WERNER M. SOLMITZ, M.D.

Radiosurgical Exploration of the Pancreas and Transpapillary Drainage of Wirsung's Canal (L'exploration radio-chirurgicale du pancréas et le drainage trans-papillaire du canal de Wirsung). LUCIEN LEGER. *J. chir.*, Par., 1952, 68: 518.

For radiosurgical exploration of the pancreas a vertical incision 3 cm. long is made through the free border of the second portion of the duodenum. Identification of the papilla is facilitated more by compression of the gallbladder than by the injection of secretin.

A polythene tube is introduced into Wirsung's canal. Contrary to expectation, the tube has a greater tendency to enter the pancreatic duct than the common duct. From 2 to 3 c.c. of a radiopaque substance are injected into the pancreatic duct and roentgenograms are taken. The tube is attached with a linen suture to the juxtapapillary duodenal mucosa, carried out through a minute incision in the duodenal wall, sutured to the anterior parietal peritoneum, and brought out through a stab wound in the abdominal wall. In this manner a functional test of the pancreatic gland can be performed. Roentgenographic studies can be repeated to ascertain whether the tube lies in its proper position.

Occasional transient, slight jaundice may be caused by partial obstruction of the papilla. As a rule, Santorini's duct is not visualized. In approximately one-half of the cases, the author noticed stenosis of Wirsung's canal at the level of the isthmus of the pancreas. Dilatation of the acini is suggestive of chronic pancreatitis. Of course, one must guard against artefacts. Diverticula of the pancreatic duct may be visualized. Dilatation and irregular outlines of the duct suggest carcinoma.

JOSEPH K. NARAT, M.D.

Clinical, Anatomopathologic, and Surgical Aspects of Cystadenoma of the Pancreas (Il cisto-adenoma pancreatico nella sua entità clinica anatomopatologica e chirurgica). GIOVANNI MARCOZZI. *Policlinico, sez. chir.*, 1952, 59: 129.

Scott's classification of pancreatic cysts, accepted by the author, distinguishes the following types: (1) cysts of congenital origin, (2) parasitic cysts, (3) retention cysts, (4) proliferative cysts, such as cystadenomas or cystadenocarcinomas, and (5) pseudocysts of degenerative, inflammatory, or traumatic origin. To these groups the author adds pseudopancreatic cysts which originate from adjoining tissues such as the omentum.

An asymptomatic papilliferous cystadenoma of the pancreas in a woman 26 years of age is described by the author. A mesogastric mass was noticed accidentally in the course of a prenatal examination. Subsequently the cyst was drained and postoperative radiotherapy was employed. A recurrence of the condition brought the patient to the author who removed the tumor. A partial resection of the body and tail of the pancreas, and splenectomy were also done. The multilocular cyst contained trypsin.

The author believes that the proliferations found at the histologic examination derived from the newly formed or aberrant excretory pancreatic ducts.

Simple cysts and cystadenomas of the pancreas should be considered precancerous lesions and therefore indicate complete removal. Internal or external drainage should be employed only in exceptional cases.

JOSEPH K. NARAT, M.D.

GYNECOLOGY

UTERUS

Plastic Unification of Double Uterus. ERWIN O. STRASSMANN. *Am. J. Obst. & Gynec.*, 1952, 64: 25.

The author classifies double uteri into two groups. The first consists of those cases presenting an externally unified uterus with two chambers formed by a septum (uterus subseptus and uterus septus). In such cases simple removal of the septum restores a single cavity. The second group includes those in which two cavities are created by two separate muscular bodies (uterus bicornis and uterus bicornis bicollis). In this group plastic unification is necessary to provide a single uterus with a single cavity.

The unification operation was performed for the first time in 1907 on a woman who had had 8 miscarriages and premature deliveries before operation, and 6 full-term babies delivered vaginally, afterwards. A total of 128 such operations has been reported so far, including 5 by the author. When first devised, the operation was usually done vaginally and the uterus was brought out through the anterior fornix. The abdominal approach became more feasible as abdominal surgery became safer.

The indications for plastic unification are habitual abortion, sterility, severe dysmenorrhea and menometrorrhagia. The presence of a double uterus per se is not an indication since 25 to 40 per cent of women with a double uterus have no disturbances from this anomaly. Hysterosalpingography should be done preoperatively to establish the diagnosis and determine the patency of at least one tube. Intravenous urography is necessary to detect concomitant urologic malformations which occur in a higher incidence than usual. The operation should not be undertaken until 6 months have elapsed after an abortion or miscarriage.

Of the total number of cases reported, there was but one operative death and this occurred in the early days. No maternal death occurred among the 83 pregnancies reported following the operation. No cases of uterine rupture were recorded. Sixty-one full-term babies were delivered vaginally, and 10 by cesarean section. Seventy babies, of 71, lived; 1 baby died in utero from placenta previa. There were 10 miscarriages. In 2 cases the outcome of the pregnancy is unknown.

The author's 5 cases are described in detail. All these women were operated upon because of childlessness. Thus far, 4 full-term pregnancies with living babies have occurred in 3 of these 5 women.

WARREN R. LANG, M.D.

Papilloma of the Cervix. MEMOIR R. MARSH. *Am. J. Obst.*, 1952, 64: 281.

The author reviews the literature concerning papillomas of the cervix. This condition is believed to be of rare occurrence and about 23 reports have appeared in the literature since the lesion was first described by Robert Meyer, in 1921. Endocervical polyps and lesions with extensive superficial squamous metaplasia are difficult to distinguish from papillomas. Eight condylomatous type papillomas and 13 noncondylomatous papillomas have been reported and, to date, 2 cases in which these lesions became malignant have been described. An interesting associated feature is that 12, or over half, of the 23 patients included in the descriptions were pregnant.

The author presents 8 new cases from the obstetric and gynecologic service of the Kings County Hospital. These lesions were treated by excision, cautery, or podophyllin (in acuminate types). Complete removal is often difficult and surgery is attended by a high recurrence rate. All lesions have a tendency to bleed and this tendency is exaggerated in pregnancy. The author indicates that these lesions may increase in number during pregnancy, or the association may be more apparent than real due to closer examinations of this age and parous group.

H. JANE C. MACMILLAN, M.D.

Clinical Relationship of Carcinoma in Situ and Invasive Carcinoma of the Cervix. GERALD A. GALVIN, HOWARD W. JONES, JR., and RICHARD W. TELINDE. *J. Am. M. Ass.*, 1952, 149: 744.

Thirteen cases of carcinoma in situ, not treated as such, were studied. The ultimate clinical course was known in all cases. Three of the lesions remained in the noninvasive stage after 2, 4, and 6 years, respectively, while the remaining 10 had progressed to various clinical stages of cervical cancer 1 to 17 years later. How long intraepithelial carcinoma was present before the original biopsy was obtained is a matter of conjecture. Consideration of these clinical and histologic data seems to permit the following conclusions:

Carcinoma in situ is potentially invasive, and, if untreated, may progress to clinically evident cervical cancer. As this study is retrospective, it does not indicate that carcinoma in situ always becomes invasive. It does, however, indicate that clinical cervical cancer is preceded by carcinoma in situ in too large a proportion of cases to be considered coincidental.

The clinical course of cervical cancer represents only a small segment of its life history and the greater part of its existence is spent in the preinvasive stage. In the patient who is destined to have cervical biopsy within 5 years previous to the time she would have developed clinical signs and symptoms of cervical cancer, the biopsy specimen is likely to show carcinoma in situ. If the lesion is diagnosed and treated in that stage, the patient's chances of being cured are almost 100 per cent.

CHARLES BARON, M.D.

Evaluation of Results of Treatment in Cancer of the Uterine Cervix. J. HEYMAN and C. O. SEGERDAHL. *Acta. obst. gyn. scand.*, 1952, 31: 365.

Appreciation of the results of therapy in cancer of the uterine cervix depends on a full knowledge of the factors which enter into the reporting of any given type of cure or survival rate.

There are three general 5 year recovery rates commonly used—"absolute" apparent, "over all" relative, and "stage." An absolute apparent rate can be applied to the reports of an institution treating all of the patients within a geographically defined area. It is suggested that the "absolute" apparent reports of all other institutions be classed as "biased" absolute rates. Actually these latter reports and overall relative rates are unsuitable for comparative purposes.

While stage rates are the only means of comparing results from most institutions, they are open to several faults in the selection or classification of the patients by different examiners. In the ordinary statistical procedure cases lost from follow up are excluded after they are lost, but this can not be readily done in studying cervical carcinoma. Less error will occur if the cases are included as "died of disease." In addition, if this practice is carried out various centers will be stimulated to trace every possible case.

Other types of rates are mentioned, principally those based on a one year period. They include the rate of dying or escaping death from treated cancer and the rate of not developing, or of developing a recurrence of the cancer. In this group the incidence of intercurrent deaths becomes an important factor. Possible corrections for their occurrences are described.

Intercurrent deaths do not appear as a major factor in 5 year recovery rates, as most institutions have the same age and intercurrent death distributions.

The procedures described in this article are those followed in the preparation of the "Annual Report on the Results of Radiotherapy in Carcinoma of the Uterine Cervix." GEORGE C. LEWIS, JR., M.D.

Case Report of a Late Lesion Which Developed After Radiotherapy of Cancer of the Cervix (Considerazioni su di un caso di lesioni tardive associate dopo trattamento attinico per cancro della portio). VITO ALBANO and MAINALDO MANESCHI. *Q. clin. ostet. gin.*, 1952, 7: 259.

Complications following applications of radium may be attributed to technical error, overdosage, or extraordinary sensitivity of the tissues. The untoward results may be early or late. The last mentioned complication appears in the form of radionecrosis or radiosclerosis.

In a woman 62 years of age, cancer of the cervix was treated with radium and x-rays. Two years later vesical telangiectasia, stenosis of the rectum, and hydrometra developed. The subjective complaints were vesical and rectal tenesmus, increased frequency of urination, and pain in the hypogastrium and the lumbar region. The hydrometra was relieved by cervical dilatation and insertion of a drain into the cervical canal.

Periodic follow-up examinations should be instituted after radiotherapy, with particular attention to the genital, urinary, and digestive tracts.

JOSEPH K. NARAT, M.D.

Cancer of the Corpus Uteri in the Obstetrical and Gynecologic Clinic of Florence from July, 1938 to December, 1951 (Il cancro del corpo dell'utero nella clinica ostetrica e ginecologica di Firenze dal luglio 1938 al dicembre 1951). ABRAMO CARIATI. *Riv. ostet. gin.*, Firenze, 1952, 7: 196.

This is a statistical study of 166 cases of cancer of the corpus uteri. The lesion formed 0.73 per cent of the entire gynecologic material seen during the same period of time. In the majority of cases the patients were in the menopause or shortly before it. In 45 per cent of the entire series the condition developed in patients with a tardy menopause; in other words, in women who were still menstruating at the age of 48 years. Twenty-five per cent of the patients were nulliparae.

Scanty metrorrhagia, associated in 25 per cent of the cases with leucorrhea and slight pains in the hypogastrium, dominated the clinical picture. The cervix was found dilated in 25 per cent of the entire series. The uterus was of normal size or moderately enlarged and had a normal or soft consistency.

Adenocarcinoma was present in 93 per cent of all the cases.

A differential diagnosis must be made from endometrial polyps, cystic glandular hyperplasia of the uterine mucosa, fibromas, syphilis, hypertension, inflammatory processes, and sclerosis of the uterine blood vessels.

Surgical intervention was employed in 70 per cent of the patients. The routine procedure was total hysterectomy and bilateral removal of the adnexa. The postoperative mortality was 6.03 per cent. Of 70 patients operated on from 5 to 13 years prior to this report, 45 (65.28%) were in good health at the time of this report. JOSEPH K. NARAT, M.D.

Stump Carcinoma—Its Treatment and the Relation Between Parity and Incidence. T. F. REDMAN. *Proc. R. Soc. M., Lond.*, 1952, 45: 331.

The incidence of cervical cancer in the stump after supravaginal hysterectomy has been shown on previous occasions to equal, if not to exceed, the incidence of cancer in the cervix of the intact uterus. The author considers in this presentation the incidence of stump carcinoma in nulliparous women, and the treatment of the disease.

Tabulated collected statistics from Von Graff, Meigs, and Fricke reveal that in all patients with stump cancer, 22 per cent were nulliparous. The author recognizes that these data are weighted and attempts to correct them by collection of the following data:

Of all women with cervical cancer in an intact uterus, 4.7 per cent were found to be nulliparous. Thirty-seven per cent of all patients who had had a supravaginal hysterectomy were found to be childless, as compared to only 16 per cent of all women (with no surgery) over the age of 34 years who were nulliparous. The author concludes from this that nulliparity does not offer the same degree of protection against stump cancer as it does to a woman with an intact uterus.

Collected statistics from several sources revealed a 5 year survival rate among 167 patients with stump cancer treated with radium of 14 to 77 per cent, with a mean survival rate of 25 per cent. A series of 24 patients treated by surgery revealed a mean 5 year survival rate of 46 per cent. A "new series" of carcinoma of the cervical stump treated by radium at the Christie Hospital, Manchester, England, revealed, among 43 patients, a 5 year survival rate of 37 per cent.

Some discussion concerning the advisability of combining surgery and radium in the treatment of stump carcinoma is presented. The conclusion was reached that in certain early cases, or in the presence of a radioresistant neoplasm, surgery would be well advised. ARTHUR L. HASKINS, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Ovarian Function After Subtotal Hysterectomy. HERBERT FREDRIKSON. *Acta obst. gyn. scand.*, 1952, 31: 376.

Premature menopause following supravaginal hysterectomy has been suggested by several authors. It has been disputed by other authors and the question still remains unsettled.

In order to obtain further evidence concerning ovarian function after subtotal hysterectomy, the author observed 21 patients whose basal temperatures were evaluated for from 6 months to 4 years following surgery. Basal temperature evaluation, usually used for the interpretation of ovulation, was considered a satisfactory means of studying the ovarian function in these 21 patients when it was followed for a period of at least 2 months. Fifteen of the patients were under 40 years of age, 5 were between 40 and 42, and 1 patient was 45 years of age.

Two patients who were less than 40 years of age at the time of operation exhibited abnormal temperature curves. One patient, aged 42 at operation, had an irregularity in her temperature curve at the age of 47 years. The remaining patients presented no abnormalities. It was thus concluded that supravaginal hysterectomy does not influence the basal temperature cycle and that ovarian function was probably unaltered by the surgery in these cases.

GEORGE C. LEWIS, JR., M.D.

Classification of Ovarian Tumors. GUNNAR TEILUM. *Acta obst. gyn. scand.*, 1952, 31: 292.

The author classifies ovarian tumors as follows: (1) non-neoplastic cysts such as follicle, lutein, inclusion, and endometrial cysts; (2) cystadenoma—pseudomucinous, serous-simple, and papillary; (3) dermoid cysts; (4) tumors with fibromatous or fibroadenomatous components, viz., fibroma, surface papilloma, fibroma adenocysticum mucinosum (Brenner), and fibroma adenocysticum serosum; (5) malignant forms of cystadenoma—cystadenocarcinoma; (6) granulosa cell tumor group—granulosa cell tumor, theca cell tumor (thecoma), and luteinized granulosa cell tumor; (7) androblastoma—androblastoma tubulare lipoides (Sertoli cell tumor, so-called folliculome lipidique of Lecène) which produces estrogen, arrhenoblastoma which produces androgen, ovarian Leydig cell tumor (adrenal tumor, luteoma, masculinovoblastoma) producing androgen; (8) gynandroblastoma (not clearly defined); (9) germ cell tumors, dysgerminoma, intermediary types (a) embryonic carcinoma, and (b) mesoblastoma (mesonephroma ovarii of Schiller) and chorionepithelioma; (10) Mesonephric ovarian tumors; (11) tumors arising in dermoids or teratomas such as epidermoid carcinoma, melanoma, argentaffinoma and struma ovarii.

The author describes and discusses certain unusual features of the various tumors mentioned above. The pseudomucinous cystadenomas, especially the microcystic variety, contain argentaffin cells similar to those found in the intestine. This supports the view that these cysts are of endodermal origin.

Granulosa cell tumors are feminizing tumors composed of cells resembling cells of the granulosa. The cells may be arranged in follicular, trabecular, or diffuse patterns. Immature types can not be distinguished morphologically from corresponding areas in androblastomas. It is now believed that both granulosa and theca-cell tumors arise from undifferentiated ovarian mesenchyme.

The androblastoma group includes two masculinizing tumors, the arrhenoblastoma of Meyer, and the tumor variously designated as adrenal rest tumor or luteoma. Also included is a feminizing tumor, androblastoma tubulare lipoides (Sertoli cell tumor or folliculome lipoidique of Lecène). The definition of this group as a histogenetic entity is based upon the demonstration of (1) identity with corresponding tumors in the male gonads and (2) transitions between the individual links and forms of differentiation of the group.

Through the histogenetic classification of the androblastoma, the following points have been elucidated: (1) the most highly differentiated arrhenoblastomas have the least pronounced hormonal effect; (2) the different hormonal effects of the androblastomas in either sex (feminizing in males, virilizing in females); (3) the hitherto unnoticed condition that the purely tubular testicular adenoma of the ovary is often associated with metrorrhagia; and (4) the estrogen effect in cases of bilateral, yellow, purely tubular arrhenoblastomas with simultaneous aplasia of the genital system, including the ovary.

The term "gynandroblastoma" was first used by Meyer for arrhenoblastomas which show a histologi-

cal similarity to granulosa cell tumors and which are accompanied by uterine hypertrophy. This type of tumor is not clearly defined.

WARREN R. LANG, M.D.

The Classification and Treatment of Ovarian Tumors. H. L. KOTTMEIER. *Acta. obst. gyn. scand.*, 1952, 31: 313.

The author reports the experiences with ovarian tumors at the Radiumhemmet, Stockholm. He classifies ovarian tumors as:

A. Non-neoplastic tumors including follicular, corpus luteum, and regression cysts.

B. Endometriosis and endometriotic cysts.

C. Primary neoplastic tumors.

1. Neoplasms with endocrine significance: (a) feminizing—granulosa cell, theca cell; (b) virilizing—arrhenoblastoma, adrenal rest, Leydig cell; (c) ovarian tumor with inverse endocrine symptoms—folliculome lipidique; (d) gynandroblastoma.

2. Neoplasms with no endocrine significance: (a) germ cell tumor—dysgerminoma-embryoma, ovarian tumors, dysgerminoma, mesonephroma (Schiller), and chorionepithelioma; (b) ovular tumors including: benign lesions, i.e., dermoid cysts and struma ovarii, malignant teratoblastomas and malignant degeneration of a dermoid cyst; stromatogenous tumors, i.e., fibroma, myoma, angioma, neurinoma, and sarcoma; epithelial tumors, i.e., benign papillary tumors with no sign of marked proliferation, serous and pseudomucinous cystadenoma, Brenner tumors, tumors with questionable malignancy (also called semimalignant epithelial tumors), papillary tumors and cystadenoma with epithelial changes identical to those seen in invasive carcinoma, pseudomyoma peritonei, and carcinoma with stromal invasion (primary, or transformation of a serous or pseudomucinous cystadenoma, or cancer of the uterus and ovaries).

D. Metastatic neoplastic tumors.

Granulosa cell tumors often demonstrate late recurrences, even as late as 10 years postoperatively. Recurrences are more common in sarcomatous granulosa cell tumors than in those of the folliculoid or cylindroid type. The association of endometrial adenocarcinoma with granulosa and theca cell tumors is well known, and 4 of 98 cases of these ovarian tumors at the Radiumhemmet were accompanied by this type of uterine cancer.

Dysgerminoma occurs usually in women less than 30 years of age. Occasionally such patients show signs of subnormal gonadal development or of pseudohermaphrodism. The right ovary is most often involved with a solid tumor of grayish-pink color on cutting. The tumor is very radiosensitive.

Surgery is the treatment of choice in ovarian carcinoma and the preservation of ovarian function must be disregarded. If only one ovary should be removed and is subsequently determined to be malignant, repeat laparotomy is recommended since in one-third to one-half of cases the lesions are bilateral. The author advises leaving the uterus in so that radium may be applied, an average dose consisting of 1,800 to 2,250 mgm. hrs. A curettage must always be carried out prior to the application. The omentum should be removed at the time of primary surgery. Roentgen therapy is also advisable.

The author reports that after primary adequate surgery and radiation therapy, about 40 per cent of patients with ovarian carcinoma live 5 years.

WARREN R. LANG, M.D.

MISCELLANEOUS

The Events of the Primate Ovarian Cycle. GEORGE W. CORNER. *Brit. M. J.*, 1952, 2: 403.

Amid all the diversity of reproductive behavior among mammals, there are two basic events in the cycle of every mammalian female. These are (1) the maturation and discharge of the ovarian follicle by which the corpus luteum is formed and the progestational phase of the reproductive cycle is initiated, and (2) retrogression of the corpus luteum, which brings that phase to an end.

There is a strange difference in the outward expression of these two events of the cycle between the human species and the other mammals that are commonly observable about us—in the house, barnyard, and laboratory. In these latter it is the ovulation phase that makes itself evident, by estrual excitement and (in many species) by cyclic changes in the external genital organs.

In the human female a very different pattern exists. The event of ovulation is not marked by any outwardly observable sign, nor by a surge of erotic responsiveness. Although in the human species the corpus luteum phase begins with no outward sign, its conclusion is marked by a conspicuous event, namely, menstruation.

The time relationship between ovulation and menstruation in the human female was not known until the German gynecologists, by direct observation of ovaries at their operating tables, and in the laboratories of surgical pathology, learned that ovulation takes place about midway between two menstrual cycles. In the rhesus monkey, the time of ovulation can be ascertained by palpating the ovaries.

In spite of the lack of external physical signs of the ovulation phase in the human cycle, and the obvious absence of any estrus-like wave of sexual responsiveness at that time, nevertheless sex activity is to a certain extent cyclic in the human female; and this is one of the most remarkable and seemingly inexplicable features of the natural history of sex in the primates. In all those Old World monkeys and anthropoid apes in which enough is known about the sex cycle to warrant a statement, observers have reported a peak of sex activity associated with the maximum state of sex-skin color or of pudendal swelling. In other words, there is a fairly typical estrus phase resembling that of lower mammals in the combination of ripening of the ovarian follicle, with a special condition of the external genitalia and

increased sex activity. Yet in all these animals, sexual behavior is less closely bound to the ovarian cycle than in lower mammals, for female monkeys and apes may and often do accept the male at other times of the cycle. In the human species, as observed in our kind of society, sex behavior is so largely controlled by psychological factors that any remainder of cyclic sex rhythmicity is, to say the least, inconspicuous. A remainder does exist, however, as in many women there is a peak of erotic responses a few days before the onset of menstruation, or a few days after the flow has ceased.

Nevertheless, let us return to consideration of events in the ovary. There is one aspect of the histological cycle about which almost nothing is known, namely, that of growth of the follicle which is to ovulate in a given cycle, and the time when it begins to enlarge beyond the average size of the follicles waiting in the ovary. This question has been fairly well answered for the sow, rat, and guinea pig, in all of which the fortunate combination of clearly definable estrus cycles and unlimited material has favored research. Study of this question in human and other primate ovaries by direct observation has been balked by various difficulties. The problem is essentially a statistical one. We need a timed series of ovaries containing ripening follicles from individuals examined during the pre-ovulatory phase of the cycle. There is never a guarantee that a given follicle will go on to rupture; atresia may set in at any stage.

Many tests have been devised to recognize the time of ovulation in the nonestruating animal. These include determination of the age of the corpus luteum by microscopic examination, by determining conception time as a result of a single insemination, by basal temperature determinations, by the electrical tests of Burr, by the study of vaginal smears, and cyclic excretion of gonadotropic hormone, and, in the rhesus monkey, by palpation of the ovaries.

Little information is available as regards passage of the ovum from the ovary to the uterus. A few observations on the rhesus monkey suggests the ovum reaches the uterus about the fourth day. The human embryo implants itself in the uterus as early, perhaps, as the seventh day after ovulation.

There is marked variability in the duration of the cycle. The standard 28 day cycle is only a statistical mode. Menstruation is a direct sequel of progesterone withdrawal and is dependent upon degeneration of the corpus luteum. An anovulatory cycle is not unusual in both the human and in the rhesus monkey. It remains an endocrinological puzzle why menstruation comes on at all when no corpus luteum is formed. ELY ELLIOTT LAZARUS, M.D.

The Clinical Value of the Determination of Hormonal Levels in Gynecology (Il valore clinico dei dosaggi ormonali in ginecologia). FRANCO MARCHESI. *Minerva gin.*, Tor., 1952, 4: 29.

Hormones may have (1) a direct effect on certain organs, (2) an indirect effect by stimulation of other endocrine glands, or (3) a combined direct and indirect effect.

Determination of the hormonal levels is not only of scientific but also of practical importance for the diagnosis as well as the therapy of certain conditions. Inasmuch as pluriglandular secretions circulate in the blood, determination of a single hormone is of no practical value. Our limited knowledge of the intermediate metabolism of hormones, the multiplicity of methods of determination of their levels, and the great variations in response of individuals and organs to the same amount of hormone make an appraisal of endocrine products difficult.

Gonadotropin contents of the urine can be determined only by biological methods. Fluorometric and colorimetric methods of assay of the estrogens are employed by the author. He uses the colorimetric chromatographic method for the appraisal of pregnandiol. The potassium tolerance test is recommended for the determination of desoxycorticosterone. Heard and Sobel's method and also the eosinophile count are used for the estimation of corticosterone, and Zimmermann's chemical method is used for the determination of suprarenal androgens. The basal metabolism rate and the creatinine and iodine values allow appraisal of thyroid function.

An increase of gonadotropin contents of the urine points to an augmented function of the prehypophysis, which may be a primary condition or a secondary one due to an ovarian or extraovarian lesion. An increased secretion of pregnandiol indicates an intensified activity of the functioning luteinic tissue which may be attributable to a luteinic tumor of the ovaries or to a pituitary lesion. Such examples illustrate the practical importance of the determination of hormones for the diagnosis of gynecologic conditions.

These methods are particularly valuable in cases in which a biopsy of the endometrium is contraindicated or furnishes no clear-cut results. The differential diagnosis of ovarian tumors may also be aided by these methods. JOSEPH K. NARAT, M.D.

A Study of the Peripheral Vascularization by Direct Light Microscopy in Relation to Endocrine Conditions in Women (Prime ricerche sulla vascolarizzazione periferica con la microscopia a luce diretta in relazione a particolari condizioni endocrine nella donna). DINO CAZZOLA and ARMANDO PRASSOLI. *Riv. ostet. gin.*, Firenze, 1952, 7: 291.

In a previous communication the authors described the effect on the peripheral vascular network of various clinical manifestations observed in the course of the ovarian cycle. Various phenomena could be produced in women and experimental animals by the administration of steroid hormones.

The authors use a special apparatus which resembles the microscope used by mineralogists and allows magnification of from 100 to 240. Not the nail bed, usually studied by capillaroscopy, but the mucosa of the major labia is the object of the investigation with the authors' apparatus.

Direct light microscopy allows a study in vivo of the formation of pericapillary edema, an appraisal of the permeability and fragility of the endothelium, and an estimation of the diameter of the capillaries. The effect on the vascular bed of hormones secreted by the body or introduced into it may be observed.

The authors showed that progesterone provokes a dilatation of the capillary network and increases the fragility and permeability of the capillaries.

JOSEPH K. NARAT, M.D.

Excretion of a Reducing Corticosteroid in the Course of Stress of Obstetrical or Gynecologic Nature (Eliminazione dei corticosteroidi riducenti nel corso di stress di natura ostetrica e ginecologica). NICOLA DAMIANI. *Q. clin. ostet. gin.*, 1952, 7: 1.

The activity of the adrenal cortex was explored by the author through determination of the reducing corticosteroids in the urine of patients belonging to one of the following 3 groups: (1) pregnant women before, during, or following labor (either normal or operative); (2) patients who underwent total or subtotal hysterectomy, and (3) patients suffering from carcinoma of the uterus and treated with radiotherapy.

The excretion of reducing corticosteroids rises after hysterectomy and remains on an elevated level for a few days, irrespective of the type of the operation, namely, total or subtotal removal of the organ.

A similar phenomenon takes place a few days after delivery, but not during the immediate postpartum period. This may be due either to a lack of pituitary shift or to a lack of rapid response of the suprarenal gland to the discharge of ACTH, as the result of exhaustion of the suprarenal cortex.

The results of determining the excretion of reducing corticosteroids after radiotherapy were so variable as to prevent any conclusions.

JOSEPH K. NARAT, M.D.

The Action of Progesterone on the Female Genital Apparatus of the Pig (L'azione del progesterone sull'apparato genitale femminile del maiale). U. CIULLA and B. PARISIO. *Ann. ostet. gin.*, 1952, 74: 218.

In 1863, Huxley divided all Mammifera into two classes, viz., the deciduates, in which the innermost layers of the uterine lining mucosa are cast off with the fetal membranes, and the indeciduates in which the contact of the fetal membranes with the lining mucosa of the uterus is simply one of apposition and the cast-off membranes are entirely of fetal origin. The deciduates include the Rodentia, Carnivora, Pinnipedia (seals, walruses), Hyracoidea, Tarsius, Elephantidae, Primates and some of the Insectivora (moles, shrews, leaping lemurs), Edentata, and Chiroptera. The indeciduates include the Sirenia (manatee), Cetacea (whales), Ruminantia, and some of the Edentata (sloths; armadillos), Chiroptera (bats), and Insectivora, the Lemuridae, Tapirus, Hippopotamus and, finally, the Equidae and Suidae.

Numerous authors have concerned themselves with the subject of the lutein effect on the structure of the genital organs of the female of the deciduates, but little has been written on the subject of this effect in the females of the indeciduates. Therefore, the authors examined the reaction, under progesterone treatment, of the female genital organs of a typical indeciduate, a member of the Suidae, or pig family (sow).

A bilateral ovariectomy was done on 12 female pigs 7 weeks of age. Two were treated as controls; 2 were treated with an Italian brand of stilbestrol in dosages of 5 mgm. every 3 days for 5 doses; 4 were treated with a similar brand of progesterone in dosages of 10 mgm. every 3 days up to a total dosage of 50 or 60 mgm.; 2 castrates were treated with stilbestrol (5 mgm. on alternate days up to a total dosage of 15 mgm. and this treatment was followed by 1 dose of 10 mgm. of progesterone.

At the end of the experimental period a few of these animals were sacrificed; however, the majority were simply laparotomized and the uterine horn (in the pig this structure constitutes the main portion of the uterus) and oviduct on one side were excised. During the period of the stilbestrol injections the external orifice of the vagina (vulva) in these animals developed evidence of congestion and discharged a stringy substance (osteal mucus); this tended to diminish with the subsequent injections of progesterone.

Histologic study of the uterine cornua showed that the giving of estrogen alone had a purely proliferative effect on the cornua; the cavity in these structures became slightly larger, the epithelium higher, the glands more numerous (remaining, however, of delicate appearance), and the chorion became poor in cells and edematous looking. The myometrium and the perimetrium developed both hyperplasia and hypertrophy of their cellular components.

The administration of progesterone was found to have a somewhat more outspoken effect upon the structure of the uterine cornua of the young castrated sow. Even in high dosages, however, this effect was not much more pronounced. The cavity of the cornua remained alike in form and size; however, the digitations extending into its lumen became more exuberant and more branched. The glandular development became greater than in the animal treated with estrogen; the cellular poverty remained the same.

The administration of both the sexual steroids, by the method described, resulted in reduction of the uterine lumen as a result of the exuberant development and complexity of the branching of the plicae. The valleylike depressions between the delicate intraluminal digitations were always superficial and never reached as far as the basal stratum of the lining mucosa of the horn. The glandular development was notable in amount. The glands became particularly densely distributed in the basal stratum of the submucosa but conserved their tubular aspect and never exhibited the tortuosity so characteristic

of the mucosa of the primates in the secretive phase. The chorion was richer in cells. The modifications in the myometrium and the perimetrium were less marked. Most striking, however, in these cases were the changes in the epithelium; in both the lumen of the uterus and in that of the glands the lining epithelia tended to become stratified under the luteoid stimulus, and a secretory appearance developed with displacement of the nucleus to the base of the cell and the appearance of secretions in the lumina. There was even apparent an undulatory tendency in the cross sections of some of the arteries of the endometrium of the sow castrated after treatment with these two steroids, which suggests an attempt at the formation of coiled arteries. This tendency in the indeciduate rather invalidates the present conceptions as to the importance of the coiled artery in the process of menstruation.

In none of these histological sections, however, was there the slightest evidence of a decidual reaction. This distinction between the deciduates and the indeciduates is ascribed to the complexity and variety (in the phylogenetic sense) of the process of nidation of the fertilized ovum. The essential function of progesterone is the preparation of the endometrium for the process of nidation; the macroscopic and the microscopic appearance of this transformation was different from species to species in accordance with the structure of the mucosa and its functioning in response to the job to be done, particularly in the placentates. In this the progesterone, fulfilling in each of the Mammifera a predominantly luteoid effect, caused an entire gamut of modality of action in concordance with the diversity of structure and of the mode of reaction of the host organ, in accordance with the diversity of functions of generation in the various species.

Seven photomicrographs illustrate the changes encountered in the endometrium of the young castrated sow under treatment with the sex steroids.

JOHN W. BRENNAN, M.D.

Operative Management of Genital Tuberculosis in the Female with Modern Bacteriostatics. (Operative Behandlung der Genitaltuberkulose der Frau unter Verwendung moderner Bakteriostatika). H. NOELLE. *Geburtsh. & Frauenh.*, 1952, 12: 496.

The postwar years in Germany apparently have given rise to a sufficient number of primary and secondary cases of tuberculosis of the female genital tract to warrant their study. The author has collected 25 cases in the past 2½ years, which were treated with streptomycin, and paraminosalicylic acid and conteben. The diagnosis, being difficult to establish, was accomplished in most instances by laparotomy, culdoscopy, or curettage. The cases of endometrial tuberculosis treated merely by the intrauterine administration of conteben are not included, nor are the cases which were treated merely by the vaginal streptomycin regime. In the author's cases the specific drug was used in the 2 weeks following radical extirpation of the infected genitalia. In cases in which one ovary was left, subsequent doses of x-rays to effect sterilization were employed.

The dosages of streptomycin, completed in 2 to 3 weeks, amounted up to 20 or 30 gm. The only direct complications were leucopenia which was treated by transfusions. No patients died, none suffered immediate postoperative shock, and in only 1 case a lingering tuberculous fistula was observed.

The author brings out the fact that tuberculosis of the genital tract is a relatively benign disease with a long life history, seldom resulting in the death of the patient. Some patients have been known to have tuberculosis and proceed to spontaneous cure; however, these cases are sharply separated from the present group.

The average age of the patients was 33 years. All of the cases in which operation was done were documented histologically. Operation consisted largely of the removal of both tubes, the ovaries, and the uterus. It was occasionally necessary to do a second operation to remove a tube or ovary not resectable at the first operation prior to chemotherapy. Several of the secondary operations were done after primary drainage of the abscess located in the pouch of Douglas with an appropriate period of chemotherapy.

In 20 cases there was involvement of the tubes, but only in 5 cases was there ovarian or uterine involvement. There was an average weight gain in these patients of 4 to 11 kgm. Follow-up studies ranged from 3 months to 8 years. All but 2 cases showed definite improvement.

One of the patients failing to show improvement in her condition was developing hepatitis. The author indicates that the present trend in the treatment of tuberculous disease is toward radical extirpation of the diseased organs, preceded and followed by appropriate chemotherapy as outlined, in addition to intraperitoneal chemotherapy.

H. JANE C. MACMILLAN, M.D.

Ascorburia in Patients with Fibromyomas of the Uterus (L'ascorburia nelle portatrici di fibromiomi dell' utero). M. GOISIS and M. FERRUZZI. *Ann. ostet. gin.*, 1952, 74: 53.

Approximately 30 mgm. of ascorbic acid is eliminated daily with the urine by normal individuals. The authors determined, with Tillman's method, the amount of ascorbic acid excreted by 35 patients with fibromyomas of the uterus. The patients were kept on a normal diet. The amount of ascorbic acid excreted in 24 hours ranged from 33 to 72.6 mgm., with a mean of 50.43 mgm.

In 10 patients the ascorbic acid tolerance test was performed by administering 1 gm. of cebion orally for 2 consecutive days prior to the test. As compared with the controls, the increase in the excretion of ascorbic acid was insignificant.

The authors attribute the relatively intensive excretion of ascorbic acid by patients with uterine fibromas to stimulation of the adrenal cortex by the tumors.

The only slight increase of excretion of ascorbic acid after oral administration of excessive amounts of it is explained by storage of the vitamin by the tumor masses in which oxidative-reducing processes are intensified. JOSEPH K. NARAT, M.D.

Accidents Complicating Pelvic Surgery in Women.
LOUIS E. PHANEUF. *N. England J. M.*, 1952, 247: 39.

In the present review, the author lists the more common complications of pelvic surgery and presents the author's experience with these complications in 1,751 gynecologic procedures from 1946 through 1950.

Included in the immediate accidents occuring during abdominal pelvic surgery are the formation of ureterovaginal and vesicovaginal fistulas, transection of the ureter, perforation of the bladder, and perforation of the bowel. Repair of the ureters, bladder, and bowel should be undertaken immediately upon recognition of injury to these structures. The technique of repair depends upon the circumstances and the degree of injury. Prevention of these accidents is accomplished by careful identification or isolation of these easily traumatized structures. Interference with the blood supply of the bladder, ureters, and bowel must be avoided. Hemorrhage as an immediate complication of pelvic surgery can be eliminated by exact hemostasis.

One of the late accidents complicating abdominal pelvic surgery is bleeding. The cause may be the sloughing of ligated tissue, or bleeding may occur as the result of undiscerning knot-tying. Awareness of intra-abdominal hemorrhage should result in supportive and transfusion therapy with laparotomy at the optimum time. The site of bleeding is located and hemostasis is accomplished. Complicating infection, when manifested as a pelvic abscess, should be treated by drainage, chemotherapy, and antibiotics. The latter are also essential in the treatment of thrombophlebitis, septicemia, and pyemia. Vein ligation is useful in the treatment of thrombophlebitis. Phlebothrombosis and thromboembolism are prevented by the proper selection of anesthesia, gentle surgery, careful hemostasis, and early ambulation. Femoral vein ligation, therapeutic and prophylactic, has been useful in the treatment of peripheral vascular complications. Careful reperitonealization of the operative site should reduce the incidence of intestinal obstruction. Continuous suction and reoperation for the release of adhesions, or resection of bowel are listed as the treatment for intestinal obstruction.

Vesicovaginal fistula is more common in vaginal pelvic surgery than in the abdominal approach to the pelvis. Ureteral injuries are uncommon in vaginal surgery. Vesicovaginal fistula, rectovaginal fistula, and hemorrhage occurring as an immediate accident complicating vaginal surgery are avoided, recognized, and treated similarly to these complications in the abdominal approach to the pelvis. Delayed hemorrhage may occur in the vaginal flaps. The author states it is best treated by packing the vagina.

Twenty-one accidents occurring in the author's operative series are reported. In 10 instances inadvertent cystotomy was treated by immediate repair, with complete recovery in all patients. Two instances of ureteral injury were treated by immediate repair and ligation of the affected ureter. One patient with urinary extravasation on the fourth postoperative day was treated with drainage and transfusions. In 4 instances, bowel injury was treated satisfactorily by immediate repair. A supravaginal hysterectomy was performed by perforation of the uterus. Pelvic cellulitis responded to penicillin and blood transfusion. An infected silk suture was removed from one patient with infection.

ARTHUR L. HASKINS, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Trials with Penicillin in the Treatment of Pre-Eclampsia and Eclampsia. GEORGE V. SMITH, O. WATKINS SMITH, and SEYMOUR L. ROMNEY. *Am. J. Obst.*, 1952, 63: 1185.

During the course of experimental work with lethal doses of menstrual toxin in rats, it was found that penicillin had a marked antitoxic action. On the theory that late toxemia of pregnancy was caused by the same toxin, the authors have tried penicillin in the treatment of pre-eclampsia and eclampsia. They present a series of 8 patients so treated. Two patients had eclampsia, 4 had severe pre-eclampsia, and the remaining 2 had mild pre-eclampsia.

The features stressed in the case reports were fluid balance, blood pressure, the amount of albuminuria present, and the symptoms of the patients.

The patients were treated by a variety of other methods until their condition became worse or failed to improve. They were then given a period free of any treatment, which was followed by the administration of large doses of penicillin. The toxemia was not cured but the symptoms were alleviated, as characterized by a reduction of albumin, an increase in urinary output, slight diminution of blood pressure, and a reduction of the patients' symptoms. Further evidence of the specificity of the penicillin was recurrence of the symptoms when the treatment with penicillin was discontinued.

JAMES F. DONNELLY, M.D.

Appendicitis in Pregnancy. Synthetic Review. (L'appendicite in gravidanza. Rivista sintetica). G. AICARDI. *Q. clin. ostet. gin.*, 1952, 7: 55.

Quite often the appendical attack which develops during pregnancy is a flair-up of a pre-existing chronic appendicitis. The cause of this is largely considered to lie in the mechanical factors at work in pregnancy; however, it may lie partly (especially in the later months of pregnancy) in the chronic dilatation of the blood and lymphatic channels of the female genital region during this period.

Appendicitis exerts an unfavorable influence on pregnancy, resulting in frequent premature births and fetal mortality. The abortions are frequently the more astonishing because the peritoneal cavity may not have been involved as the acutely inflamed appendix may have been cleanly removed without touching, or otherwise disturbing, the pregnant uterus. The author believes that some of the astonishing instances are to be ascribed to some noxa originating in the appendix itself and carried to the pregnant organ by way of the blood or the lymph streams.

Some of these premature births take place so long after the appendix has been removed or after the inflamed condition of this organ has subsided as to lead to the belief that some transference of the infective agent has taken place, perhaps to the endometrium or placenta, and has then continued to develop, or has lain dormant until it was re-activated.

However, the pregnancy also exercises an unfavorable effect on the appendical process. Perforation and gangrene are more frequently encountered in pregnancy than in the absence of the pregnant state. There is grave danger, especially in the later months of pregnancy, that the uterus, with its continuous process of enlargement by mechanical traction or by circulatory changes, may light up a dormant process, or break up limiting adhesions and permit the spread of an encapsulated abscess to the free peritoneal cavity. Once the purulent process has started to spread, its development tends (especially in the later months of pregnancy) to proceed more rapidly than such development in the nonpregnant state and, as a consequence, any delay in instituting the operative treatment in these cases is more apt to have fatal consequences.

The last-mentioned consideration is particularly unfortunate, in that the diagnosis of appendicitis in pregnancy is frequently very difficult. A large number of conditions about the genitalia of the female or even those generally encountered in the abdomen and, indeed, in the chest may so closely simulate a phase of appendicitis as to render the diagnosis largely one of exclusion. Every resource of differential diagnosis will be required.

The treatment of appendicitis, whether in the pregnant state or not, is always surgical. The treatment will be surgical no matter what the stage of development of the gravid condition. Fortunately, in early pregnancy the treatment will not differ essentially from that habitually employed for the same condition in the nonpregnant state. The incision should be placed laterally (MacBurney or Jalaguier) and the appendix removed; the pregnant uterus should not be disturbed in the hope that the pregnancy will go on to normal term. This abstentionist attitude is also justified when the child is not yet viable (before the eighth month) or is of doubtful viability.

In the late phase of pregnancy the treatment recommended by the author consists of a preliminary cesarean section with opening of the abdomen in the midline if the child is viable. The uterus is carefully isolated and the cesarean section is completed as aseptically as possible. The uterine wound is then closed with precision before the appendical condition is attacked. In the author's opinion the technique here described can be carried out without infecting the uterus itself. It more or less assures the life of the child and does not, in his opinion, essentially endanger the life of the mother.

JOHN W. BRENNAN, M.D.

Considerations with Reference to the Treatment of Cervical Cancer in Pregnancy (Considerazioni sulla terapia del cancro cervicale in gravidanza). PIERO BAILO. *Q. Clin. ostet. gin.*, 1951, 6: 663.

In the material of the Division of Obstetrics and Gynecology of the Maggiore Hospital of Bergamo, in Italy, during the past 20 years, the author finds 5 instances of concomitancy of cervical carcinoma and pregnancy. These cases comprised 0.022 per cent of 22,067 obstetrical admissions. The youngest patient was 28 years of age, the oldest 44. Parities ranged from 2 childbirths in the youngest, to 11 in the oldest patient. Two of these patients were admitted for treatment during the first three-month period, 1 patient was admitted during the second, and 2 patients during the third three-month period. In all but one of these patients the condition was adjudged as already inoperable.

Three of the women died in from 5½ months to 2 years after leaving the hospital—2 of these despite roentgen therapy, vaginal radium, and other treatment. The third patient refused all therapy. All died of the effects of the growth of the neoplasm.

Of the 2 patients who are still living, 1 was examined by the author 19 years later, the other 13 years later. In one of these 2 living patients the process, when observed, was at a very early stage of development, in the second month of pregnancy, and a total hysterectomy was performed without further treatment; in the other case vaginal radium therapy (58 m.c. hours) and roentgen treatment (8,000 roentgens in 4 fields) were given. This second patient also began receiving treatment in the second month of pregnancy. This treatment was given in 1938. The patients who died were treated at a much earlier period (1932).

With the better modern understanding of the needs of irradiation in these patients with cancer of the uterine cervix, the author believes that the postulation which states that in the early months of pregnancy the physician should not consider the life of the child, need no longer apply; however, he does not hereby wish to pass lightly over the fact that the very early case of carcinoma of the uterine cervix can be cured by surgery (hysterectomy). As a matter of fact none of these children survived; in 2 of these cases an abortion resulted from the irradiation therapy employed, in a third case the child was immature, and the 1 child which was born alive and well died 6 months later of some pulmonary involvement, apparently unconnected with the treatment. JOHN W. BRENNAN, M.D.

LABOR AND ITS COMPLICATIONS

Results of the Study of a "Diagram of Labor" (Résultats de l'étude du "diagramme d'accouchement"). TH. KOLLER and K. ABT. *Rev. fr. gyn. obst.*, 1952, 47: 163.

In a diagram of labor a graphic representation of labor is provided. It is believed that this diagram facilitates the control of labor, avoids misunderstandings by obstetricians and midwives, and lends itself to a scientific study of labor. The ordinate is the dilatations of the cervix and the abscissa is the hours of labor. The axis of the ordinates is the hour at which rupture of the membranes takes place. Various events of labor, for example, injections of pituitary hormones and the application of forceps, are written in the proper place. A curve is formed by joining the various reference points that denote the dilatation of the cervix. By superimposing the ordinate at the rupture of the membranes of many graphs it can be seen that most curves fall within a narrow limit. Beyond that limit are zones of relative and absolute danger. If the curve extends into these danger zones there is an increase in operative deliveries, morbidity, mortality, fetal distress, and hospitalization.

JAMES HENRY FERGUSON, M.D.

Recent Trends in Cesarean Section and Their Influence on Maternal and Fetal Mortality. JAMES H. WILLIAMS and ZEPH J. R. HOLLENBECK. *Am. J. Obst.*, 1952, 63: 1254.

The authors' report is based on the study of 17,586 deliveries with a maternal mortality of 0.15 per cent over the 10 year period from 1940 through 1949. During this time, the cesarean section rate was 2.98 per cent with a tendency towards a gradual increase of 1.12 per cent to 4.5 per cent throughout the decade. The indications were uterine scar, dystocia, bleeding in late pregnancy, toxemia, intercurrent disease, and miscellaneous factors. There had been, likewise, a gradual trend away from the classical cesarean to the lower cervical cesarean section.

There were 6 maternal deaths, all of which followed classical cesarean section. The fetal salvage was discussed in relation to the birth weight.

The authors concluded that the lower cervical cesarean section is safer than the classical procedure. Local anesthesia is safest as far as the infant is concerned. JAMES F. DONNELLY, M.D.

PUERPERIUM AND ITS COMPLICATIONS

Extensive Necrosis of the Amnion in the So-Called Mucous Childbirth (Ausgedehnte Amnionnekrose bei sogenannter Schleimgeburt). WERNER HINZ. *Geburtsh. & Frauenh.*, 1952, 12: 610.

A 30 year old primipara, after a normal pregnancy, came to labor 10 days late. After 9 hours of labor pains, the head was born in left occiput anterior presentation. There was no amniotic fluid; the only contents of the amniotic sac, aside from the fetus itself, was a partly clear, partly meconium-permeated mucous material. The child was asphyctic and did not survive. The placenta and membranes were delivered spontaneously 20 minutes after the birth of the child. The infant appeared normal at term. Autopsy on the cadaver disclosed penetration of the mucous substance together with the meconium into the air passages (death by aspiration of the amniotic contents).

Examination of the secundines disclosed a more or less normal placenta, but an oddly thickened and rigid-feeling amniotic sac.

Histologically, there was encountered an extensive necrosis and stromal edema of the peripheral amnion, associated with thickening and fibrous increase of the chorion. The villous structures of the peripheral area evidenced pronounced regressive changes—changes which the author ascribes to an incomplete regression of the chorion laeve. A thick layer of decidual tissue was adherent to the chorionic tissues, which was evidence of hydropic changes.

The placenta area, on the other hand, appeared to be entirely normal; the amniotic epithelium was here intact. This epithelium was, in fact, pluri-stratified in places, and exhibited evidence of secretory activity.

The author believes that the amniotic fluid was secreted in normal amount and manner by the amniotic epithelium in the placental area and was later resorbed by the abnormal cells in the peripheral areas of the sac, a portion of the sac which in this instance was deprived of its epithelial covering (necrosis) and which contained decidual cells in advanced stages of hydrops. Thus, the mucous contents of the amniotic sac is to be regarded as the result of a high-grade resorptive condensation product, or residuum, of the amniotic fluid. JOHN W. BRENNAN, M.D.

MISCELLANEOUS

Clinical Considerations with Reference to Malignant Chorioepithelioma (Zur Klinik des "Chorioepithelioma malignum"). HERBERT HUBER and GEORG HOERMANN. *Geburtsh. & Frauenh.*, 1952, 12: 511.

Twenty-two women with the diagnosis of chorioepithelioma were observed at the University Gynecologic Clinic of Kiel, Germany, since 1922. The authors were able to review the gross and microscopic specimens from these patients and restudy the patients themselves. The material included 13 cases of chorioepithelioma which was confined to the uterus. In each of these instances the uterus was completely removed and in each the patient has remained without recurrence for a period of from 3 to 20 years or more. There were 5 instances of this condition accompanied by vaginal metastases and, here again, total hysterectomy resulted in all of the patients remaining free from recurrence for periods of from 2 to more than 20 years. In this material the vaginal metastases could not always be radically extirpated; however, they regressed either under various forms of treatment, or without treatment, in the course of a few weeks to about a month. Finally, there were 4 patients with vaginal and also pulmonary metastases; 3 of these patients died. The fourth patient recovered; irradiation was used in the vagina and the vaginal metastases regressed; the pulmonary metastases disappeared spontaneously after a few weeks.

The authors think that these 19 patients who recovered (86.4 per cent with absolute cure) did not suffer from true chorioepithelioma malignum, and they agree with Schopper and Pliess that the condition in the patient who recovers should not be termed "chorioepithelioma"; it should be called "chorioepitheliosis."

The authors propose that these cases of chorioepitheliosis should be classified, in accordance with the classification in use for endometriosis, into (1) chorioepitheliosis interna (a) cellular hyperplasia confined to the walls of the uterus itself and (b) destructive hydatid or cystic mole; and (2) chorioepitheliosis externa (a) cellular hyperplasia outside of the uterus and (b) metastasizing hydatid or cystic mole. This classification leaves only malignant chorioepithelioma in the true sense in this group of tumors of the female genitalia. However, this condition is regarded by the authors as of relatively rare occurrence.

In the true malignant chorioepithelioma, the tumor and its metastases are capable of independent existence; in chorioepitheliosis, on the other hand, the continuance and development of the tumor and its metastases seem to be dependent upon factors as yet unknown. Thus, the authors think that every woman with a diagnosis of chorioepithelioma malignum should not be subjected to a mutilating operation (total hysterectomy). The disadvantage of not being able to distinguish histologically between the malignant chorioepithelioma and the benign epitheliosis will, in the authors' opinion, be largely overcome by a careful clinical study of the course of the condition. Repeated biologic pregnancy tests would seem to offer a fairly secure means of making the differentiation. If, following the removal of such of the original process as can be reached (expulsion of the mold, curettement of the uterine cavity) the biologic pregnancy test remains strongly positive or becomes more pronounced, removal of the uterus is, of course, indicated; however, if the biologic pregnancy test regresses or becomes negative, the uterus, particularly in the young woman, should be left in place and the results of therapy that will not mutilate the young, prospective mother should be awaited. JOHN W. BRENNAN, M.D.

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Plastic Operation for Hydronephrosis (Zur plastischer Operation bei Hydronephrose). H. HENNINGER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 271: 381.

In a series of 113 patients with hydronephrosis, the author personally operated on 80 per cent, and was able to follow them up for as long as 8 years after operation. Nephrectomy was performed in 62 cases. In 51 patients the organ was preserved; of these, 41 were treated by plastic resection with or without flap formation, and 10 were treated by other methods such as implantation of the ureter in 4 cases, the Fenger plastic operation in 2 cases, ureterolysis in 3 cases, and the flap plastic procedure without resection in 1 case.

Although it is best to do a conservative operation whenever possible, it remains to be determined whether nephrectomy is indicated and whether the organ *can* be spared. The one-hour excretion recorded in intravenous urography has proved a good criterion. If exposure 1 hour after the injection shows no excretion, hydronephrotic transformation of the kidney is probably so far advanced that restitution is unlikely. Misleading results due to obstruction of the ureter in patients with normal parenchyma may be avoided by taking several urograms at different times prior to operation. This error is not so likely to be made since hydronephrosis is usually of long duration, but might occur in cases of intermittent hydronephrosis. The clearance method is a valuable aid. Mixed bladder urine as a source of error can be avoided if the urine of one kidney and the bladder urine yield similar results. No urine from the other kidney has then reached the bladder via the catheter and one may thus obtain accurate clearance values for both kidneys.

The indication for conservative operation is of course very strong in patients with only one kidney. The anatomic result is not the only criterion of success of the operation. In some kidneys, the anatomic result of operation may be perfect, but the kidney will not function. The aim of technique is, therefore, not a cosmetic one.

In the plastic operation for hydronephrosis, the aim is to remove the obstruction at the neck of the ureter. Various methods have been suggested—the Fenger plastic operation, the Foley-Schwyzer plastic operation, and others. The Hyrntschak method of plastic resection is not the method of choice, since it frequently fails to relieve the ureteral stenosis. In such cases Deuticke's modification with torsion of the flaps or interpolation of a tongue-shaped flap are indicated. Reimplantation is reserved for severe congenital ureteral stenoses of 3 to 5 cm. in length, which require resection of the ureteral constriction, and for those rare cases in which a crossing vessel must be spared to prevent threatening disturbances of nutrition. In hydronephroses of a less severe degree, the simple techniques of Fenger and Foley-Schwyzer suffice. Nephropexy will be required as the terminal step of plastic operation in the great majority of cases.

In the present series, 51 organ-preserving operations were performed for hydronephrosis, including plastic resection without flaps (30 cases), flap-resection technique (11 cases), plastic flap operation without resection (1 case), reimplantation (4 cases), Fenger plastic operation (2 cases), and ureteroadhesiolysis (3 cases).

Results were very good in 27 cases; moderately good in 13; not very satisfactory in 5 cases; requiring secondary nephrectomy in 4 cases; and under observation for too short a period to judge of results in 2 cases. This evaluation was based primarily upon renal function and secondarily on anatomic findings. Infection developed in only 5 cases. There was one death in a patient with chronic uremia before operation.

Secondary nephrectomy had to be done in 4 cases. In 1 patient nephrectomy was done for recurring stone. Nephrectomy was done in 1 patient with postoperative fever and pneumonia, and in this case the kidney removed was found to be quite normal and subsequent operation revealed a lung abscess, removal of which was followed by recovery. The third case in which nephrectomy became necessary was one of recurring pyelitis and severe ascending pyelonephritis. In the fourth case there was Bacillus coli infection of the urine. Exposure of the left kidney revealed a large aberrant vein that could not be resected without danger to the kidney. The ureter was therefore reimplanted but a postoperative valvelike obstruction developed at the site of reimplantation. Since catheterization was unsuccessful, a secondary nephrectomy was performed.

A postoperative thrombosis of the femoral artery in another case was cured by thrombectomy and in 2 cases stones formed following the plastic operation.

A tabular resume of the 51 cases treated by plastic operation is included, with anamnesis findings, preoperative findings, type of operation, postoperative findings, and the late results in each case.

EDITH SCHANCHE MOORE.

Renal Bisection. G. W. SLAUGHTER. *J. Urol.*, Balt., 1952, 68: 17.

The author expresses the conviction that the presence of a stone in the kidney too large to pass spontaneously is an indication for operative intervention. He has reached this conclusion following the observation of a series of 80 patients, 16 of whom were subjected to extensive nephrotomy for bilateral staghorn calculi and 8 of whom were subjected to a similar procedure performed on a solitary

kidney. The 1 death in the series was due to massive atelectasis, and there was 1 instance of secondary hemorrhage which responded to supportive therapy. These satisfactory results have been an important influence in generating the author's enthusiasm for nephrolithotomy.

He attributes these results to the following factors: (1) the use of a nephrotomy technique which minimizes hemorrhage and tissue destruction, (2) the use of chemotherapy and antibiotics, (3) the ready availability of blood for the treatment and the prevention of shock, and (4) the application of newer knowledge of electrolyte balance.

In cases requiring extensive nephrotomy, the author exposes the kidney in the routine manner. A rubber-shod clamp is used to occlude the pedicle. Following this, a sagittal incision is made into the renal cortex in the so-called avascular line of Brodel. Every attempt is made to remove the stone intact; a careful search is carried out for any remaining fragments. After irrigation of the calyces, obviously large vessels are occluded with suture ligatures of No. 00000 catgut. The renal pedicle is then released for a short time and any further arterial bleeding similarly secured. The rubber-shod clamp is again closed. The kidney capsule is approximated with two continuous lock-stitch sutures of No. 00000 chromic catgut. The capsular sutures are begun at each pole and tied on each side of a No. 24F Malecot catheter which is placed in the renal pelvis. Mattress sutures of similar material are then placed 1 to 1.5 cm. below the incision. A strip of ribbon gut 1 cm. wide is used to engage the loops of the sutures on each side of the renal parenchyma. The renal pedicle is then released. Additional mattress sutures are used to control bleeding if necessary.

Four representative cases are reported.

JOHN T. GRAYHACK, M.D.

End Results of Nephrectomy for Hypertension. W. F. BRAASCH. *J. Urol.*, Balt., 1952, 68: 6.

A review of the results in 100 cases of nephrectomy performed for hypertension is presented. Sixty of these cases were followed up for 5 years or more; of these 60, 53 per cent showed either a significant drop in blood pressure or a return to normal. The remaining 40 cases were followed up from 2 to 5 years; 64 per cent of these showed significant improvement.

Although the exact mechanism by which unilateral renal disease produces hypertension is not completely understood, the reported results demonstrate its apparent etiological relationship to hypertension. The fact that in these instances nephrectomy may cause return of the blood pressure to normal is substantiated.

For good results in a high percentage of these cases, a careful selection of patients is necessary. There is no test which will definitely implicate unilateral renal disease as a cause of hypertension. Atrophic pyelonephritis, hydronephrosis with infection, and renal tuberculosis are the renal lesions most frequently encountered in cases of hypertension; they are also the conditions in which nephrectomy seems to afford the best results. In choosing subjects for nephrectomy, it is important to be certain that the remaining kidney is free from disease and that the general condition is good. Advancing years (50 or more) or a long history of hypertension greatly decrease the likelihood of a satisfactory blood pressure response following nephrectomy.

The author points out the necessity of following up the patient's blood pressure for at least 2 years after nephrectomy before a definite decision that the procedure has been beneficial. The recurrence of hypertension after an apparent improvement may be delayed as long as 5 years or more. It is suggested that this may be due to vascular changes in the remaining kidney or to a reactivation of a dormant essential hypertension.

JOHN T. GRAYHACK, M.D.

Results in Ureterocystoneostomy (I risultati dell' ureterocistoneostomia). SAVA PETKOVIC. *Urologia*, Moskva, 1952, 19: 125.

Sixteen ureterocystoneostomies are reported by this scholarly and competent urologic surgeon, member of the faculty of the University of Belgrade, Serbia. The operations were done on 14 patients—in 2 the operation was done on both sides. Four of the 14 patients were suffering from ureterovaginal fistula as a result of operation for cancer of the uterus. In 1 woman the ureterovaginal fistula, resulting from a hysteroplasty, was bilateral; the operation here consisted of reimplantation of one ureter into the bladder and the anastomosis of the other ureter with its fellow (technique of Boari).

In 5 patients the ureterocystoneostomy was done because of a ureterostomy in tumor of the bladder. Here the problem to be decided was between doing a radical cystectomy or doing a partial cystectomy with re-implantation of the involved ureter. In these decisions the author warns against permitting the desire to save the kidney to influence the degree of radicality of the operation; the danger of recurrence of the tumor is always of the greatest importance.

On one occasion the ureterocystoneostomy was done during the operation for tumor of the intramural portion of the ureter itself. Patients with this condition seem to be particularly unsuitable for this type of operation; in the author's material there were 10 of them but ureterocystoneostomy could be done in 1 only.

In the last group were 3 women with vesicovaginal fistulas. Here the reimplantations (5 ureterocystoneostomies) were performed on the occasion of operating on the fistulas.

The results were as follows: 1 patient requested a secondary nephrectomy; 1 had a bilateral reimplantation and died 8 months after the operation; 10 patients had a satisfactory result after 3 to 12 months, respectively; 2 patients had good immediate results (too recent for proper evaluation); and the

remaining patient had a successful reimplantation, but the tumor has recurred.

These results were evaluated on the bases of studies with cystoscopy, chromocystoscopy, urography, and sounding of the ureter. Chief reliance was placed on the urographic test and the presence or absence of pyuria. These postoperative studies have too often been neglected in less recent times.

The author thinks that with emphasis on placing the indications for durable results and with the restrictions in tumor cases, as discussed, the technique of reimplantation of the ureter is deserving of wider application.

Finally, the author mentions conditions in which reimplantation is used only exceptionally—intrinsic tumors of the ureter (as mentioned) and accidental injuries to the ureter, particularly gunshot wounds of war in which infection always seems to render the technique impracticable.

JOHN W. BRENNAN, M.D.

BLADDER, URETHRA, AND PENIS

Total Cystectomy in Two Stages in the Treatment of Bladder Carcinoma (Die zweizeitige totale Cystektomie bei der Behandlung des Blasenkrebses). S. PETKOVIĆ. *Zschr. Urol.*, 1952, 45: 269.

Total cystectomy is indicated only in the later stages of carcinoma when the tumor has invaded the deeper layers of the muscularis. In smaller tumors in which only the submucous tissue or the superficial layers of the muscle are involved, less radical procedures such as partial cystectomy, radium irradiation, or both, are often successful and protect the patient against the later complications of total cystectomy, especially ascending infection of the kidney as a sequel to ureterocolostomy.

The question as to whether total cystectomy should be performed in one or two stages depends on the general condition of the patient. A two-stage operation is indicated in elderly patients, in patients with inoperable bladder carcinoma, and in severe anemia after hemorrhage. The author performs bilateral ureterocolostomy as the first stage, and extirpates the bladder 2 or 3 weeks later.

In most cases the ureterocolostomy was done in the Coffey I manner. Only in rare cases were implantation without a canal in the submucosa, extraperitoneal implantation, and transsacral implantation used.

The overall postoperative mortality was 20 per cent among the patients operated upon by the author.

WERNER M. SOLMITZ, M.D.

Chronic Urethritis in Girls. CLARENCE V. HODGES. *J. Am. M. Ass.*, 1952, 149: 753.

Recurrent urinary tract infections in the young female are most commonly caused by chronic posterior urethritis, according to the author. The frequency of recurrent urinary tract infections in girls is well known to all practitioners. With the advent of chemotherapeutic agents and antibiotics the infections were rapidly brought under control, but repeated recurrences and the eventual ineffectiveness of the therapeutic agents led to an investigation of the underlying processes involved. Careful cystourethroscopic examinations of these individuals will frequently reveal lesions characteristic of chronic urethritis, such as hyperemia and edema of the bladder neck and the posterior third of the urethra with increased prominence of the longitudinal folds and hyperplasia of the urethral epithelium. From this minor involvement, one sees in the severer cases of longer standing a paler mucosa which is granular, with epithelial hyperplasia associated with villus and polyp formation.

After having established the diagnosis, the author was able to attain satisfactory results with a total of three urethral dilatations at 10 to 14 day intervals under local anesthesia consisting of 5 per cent cocaine applied topically on cotton applicators. The dilatations are carried up as high as #24-F. Bladder instillations were not used. It was not necessary to perform cauterization or fulguration of the urethra. When the chronic urethritis was associated with positive urine cultures, appropriate agents were administered.

PETER L. SCARDINO, M.D.

MISCELLANEOUS

Further Studies on the Improvement of Methods to Detect Tubercle Bacilli in the Urine and in Punctates by Means of Membrane Filtration (Weitere Untersuchungen zur Verbesserung des bakteriologischen Tuberkelbakteriennachweises in Urinen und Punktaten durch Membranfiltration). R. TROMPKE and E. KROEGER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 271: 1.

It is needless to stress the importance of early verification of tuberculosis in urinary tract symptoms and to detect tubercle bacteria in abscesses. So far the most reliable method has been culture and animal inoculation, both time-consuming methods. Ultracentrifugation has improved the early results. However, this method often fails and a variety of other ways has been described, none of which has proved entirely satisfactory.

Lange, 25 years ago, called attention to membrane filtration, a method further studied and improved by Tietz in 1949. The principle is the passing of prepared urine and pus through certain small filters and then staining the filtrate in the ordinary fashion and observing it directly.

The authors examined 65 urines and 50 punctates (purulent material, exudates, and transudates). Studies of the urines showed a definite superiority of membrane filtration as compared with cultural and microscopic examination of the sediments. In the majority of cases of suspected tuberculosis the diagnosis can be arrived at within a few hours. One difficulty encountered was the impossibility of differentiating between various acidfast organisms and perhaps actinomyces. These organisms are rare in

ureter urine, however, and differentiation may be possible clinically. The examination was carried out on morning urines and according to Tietz's description.

Purulent exudates and transudates also were prepared in a special way and likewise examined on membranes, in sediments, and in cultures. Here, the authors concluded that one cannot safely arrive at an early diagnosis with membrane filtration alone and that cultural verification is necessary.

Filter cultures were not prepared, but from these preliminary studies one would suspect that they might be of great value. The present method, although short as compared to previous ones, is quite a complicated procedure and requires great care and experience. If well controlled its advantages over customary sediment examination and time-consuming cultures are obvious.

Two newer methods have been described since this publication: (1) the accumulation of bacteria in the electric field (Seybold), and (2) slide microcultures (Pryce-Jensen). The former method is said to give better results than membrane filtration in the examination of spinal fluid. The latter procedure gives good results by culture as early as 1 to 2 weeks.

KURT BENIRSCHKE, M.D.

The Role of Infection in Nephrolithiasis. GRAYSON CARROLL and R. V. BRENNAN. *J. Urol.*, Balt., 1952, 68: 88.

Many investigators believe that bacteria play an important part in original stone formation. In support of this view Rosenow found bacteria adjacent to regions of calcification in renal papillae in 24 of 37 cases. In an equal number of papillae not showing plaques, bacteria were present in only 1 case. Keyser has experimentally produced renal calculi by traumatizing renal papillae and injecting a culture of Proteus bacilli. Staphylococci have been cultured from the organic framework of stones.

It is more generally agreed that infection plays a part in the recurrence of stone. This is commonly due to urea-splitting organisms which produce a highly alkaline state with the formation of ammonia and carbon dioxide. Soluble monocalcium phosphate is changed to more insoluble dicalcium phosphate. The stones recurring because of infection are generally composed of magnesium ammonium phosphate, calcium carbonate, and calcium phosphate. Rarely is infection seen accompanying stones of uric acid, cystine, xanthine, and oxalate. Two organisms, the Micrococcus and the Proteus, are the main offenders. In a study of 332 organisms the authors found that practically all strains of Proteus vulgaris decomposed urea. About 50 per cent of the Micrococci, including the albus and aureus, and the hemolytic and the nonhemolytic, had this property.

The first objective is to discover whether a urea-splitting organism is present. Often the behavior of an organism noted on smear but not grown on culture is atypical. To supplement the bacteriologic study a method is described to determine the amount and activity of urease in the urine. This affords information as to the amount of urease capable of decomposing the urea present in the urine. Urease acts on urea in a phosphate buffer solution, and the amount of enzyme present is inversely proportional to the length of time required for the pH to rise from 6.7 to 7.7.

Many infections occur secondarily to stones. The primary treatment is surgical drainage. The common secondary invaders are the Escherichia coli, Pseudomonas aeruginosa, Aerobacter aerogenes, and the Streptococcus faecalis.

The preferred treatment for Proteus infection is chloromycetin in large initial doses and gantrisin. Micrococcus infection is best treated with penicillin. Mapharsen has been used successfully, as have also terramycin and aureomycin for resistant strains. Escherichia coli is the most common among the secondary invaders and usually responds to mandelamine and gantrisin.

ALLAN K. SWERSIE, M.D.

The Intestinal Bladder (Die Darmblase). R. UEBELHOER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 271: 202.

The author uses the term "intestinal bladder" (Darmblase) for an operation in which a portion of the sigmoid is isolated and the ureters are implanted in the wall of the isolated loop which thus acts as a substitute for the bladder. This method is indicated in conditions in which not only the bladder but also the sphincter ani are incontinent, as in myelocele or in ectopy of the bladder.

A number of cases are described in which this operation was performed successfully.

WERNER M. SOLMITZ, M.D.

The Diagnosis of Intersex. D. INNES WILLIAMS. *Brit. M. J.*, 1952, 2: 1264.

It has become increasingly evident that few clinicians are able to satisfactorily diagnose correctly infants of doubtful sex sufficiently early to intelligently direct and guide parents in a proper method of management. In an effort to obviate these errors and to prevent confusion in the minds of clinicians and parents, the author has submitted a simple and workable outline of diagnosis of intersex.

The most frequent type of intersex encountered clinically is that of the female pseudohermaphrodite whose deformity is the result of adrenal hyperplasia in utero, resulting in clitoral enlargement, a persistent urogenital sinus, and the later development of muscularity and hirsutism as the adrenal hyperplasia continues after birth. There is failure of breast development at puberty, amenorrhea, and coarseness of the voice. Anatomical studies will assist the clinician in a satisfactory diagnosis. The vagina, as well as the absence of a verumontanum, can be demonstrated with a urethroscope. A satisfactory hysterosalpingogram can be produced; however, in all such cases laparotomy is necessary before any plastic surgery is performed on the external genitalia and at this time the surgeon will see an infantile uterus

with normal tube and usually cystic ovaries. During the laparotomy, examination of the adrenal glands may reveal cortical enlargement. Urinary excretion of 17-ketosteroids is usually elevated and radiographs of the wrists will show advanced bone age.

In the past, treatment has been unsatisfactory both medically and surgically, but recently the administration of cortisone has resulted in encouraging improvement in a small series of cases. While intersex females without adrenal disorder have been reported, this entity is not without controversy and the author wisely omits discussion of this type of female intersex.

The male pseudohermaphrodite is the second most common type of intersex in which the male individual has purely feminine external genitalia and bodily habitus and while these cases are always regarded as girls and the body development is upon the expected female lines, the vagina usually ends blindly and exploration reveals testes with rudimentary epididymides and vasa. The testes histologically present the features of undescended and undeveloped organs. Usually a familial history of the anomaly is obtained. In many cases the only treatment required is that of bilateral orchectomy because of pain. Stilbestrol may increase the size of the breast and promote the growth of pubic hair.

In the male intersex with masculine external genitalia but feminine uterus, the only treatment indicated is that of exploration, hysterectomy, and salpingectomy with surgical attention directed toward descent of the testes which are usually within the inguinal canal.

The third type of male intersex in the classification is associated with external genitalia of equivocal sexuality. This is a rarer type and somewhat heterogenic, but requires great discretion on the part of the physician who sees the child initially. Wide variations in anatomical abnormalities exist, from the simplest type associated with an extreme degree of hypospadias, small penis, and bifid scrotum, to those in which there is an associated vagina opening into the posterior urethra, or externally, and in addition a uterus with fallopian tubes. Where this type of intersex has its sexual direction toward that of the male little trouble is experienced; however, where the psychological evolution is geared toward that of a female, difficulty is often encountered during adolescence.

The third and final type of intersex in this classification is that of the true hermaphrodite. These are individuals possessing both testicular and ovarian tissues but the diagnosis can be made only by gonadal biopsy. It is therefore important that the recognition of this condition and its management be made as early as possible and the diagnosis established by biopsy. The sexual determination is judged on the basis of the sex already chosen by the individual or his parents. The surgical treatment should approximate the bodily form in appearance of the genitalia to the chosen role and directed toward the gonads and the secondary sexual organs. Toward the male, hypospadias repair may be required as well as hysterectomy, while towards the female amputation of the phallus and plastic operations on the vagina are indicated.

This excellent dissertation brilliantly clarifies the intersex picture and is lucidly illustrated and documented with photographs, sketches, and case reports.

PETER L. SCARDINO, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Late Results of Treatment of Acute Osteomyelitis with Trepanation of the Bone and Instillations of Penicillin (Ueber das weitere Schicksal der mit Knochentrepanation und Penicillininstillation behandelten akuten Osteomyelitis). WOLFGANG KOELE. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 272: 201.

Before the introduction of antibiotics, from 30 to 40 per cent of the cases of acute osteomyelitis would go into the chronic stage in spite of energetic treatment, and the mortality of the acute condition ranged from 5 to 10 per cent.

The author treats the lesion in the following manner:

An incision is made over the painful area, and the subperiosteal abscess, if such is present, is opened. Otherwise the periosteum is pushed to the side and the bone is trephined. The bone marrow is irrigated through a modified Cushing needle with penicillin in saline solution. The wound is sutured with the needle in situ. Twice daily 50,000 units of penicillin are instilled through a rubber tubing connected with the needle. In severe cases this treatment is supplemented with intramuscular penicillin injections at 3 hour intervals.

In a group of 31 cases the results were excellent in 83 per cent and poor in 17 per cent. The last-mentioned group consisted of patients who were admitted not earlier than 10 days after the onset of the disease.

JOSEPH K. NARAT, M.D.

Two Fatalities in 115 Cases of Osteomyelitis (Deux cas mortes sur cent quinze ostéomyélites aiguës). P. L. CHIGOT and A. MOLÉS. *Mem. Acad. chir.*, Par., 1952, 78: 560.

These two fatalities among 115 cases of osteomyelitis occurred in spite of penicillin therapy. In 1 case 1,600,000 units were given daily while in the other 500,000 units of penicillin and sulfonamides were administered. The latter patient was penicillin resistant, but sensitive to streptomycin, less sensitive to chloromycetin, and only slightly sensitive to terramycin and aureomycin. The sensitivity test is considered of the utmost importance for the prognosis of osteomyelitis. The various test methods are: (1) testing the infecting agent against an increasing concentration of antibiotics after 24 hours in test tubes, and (2) measuring the inhibitory effect of 4 or 5 antibiotics on the agent in a Petri dish by means of the diameter of growth inhibition.

As a therapeutic dosage the author uses the following daily scheme: penicillin—1 million units, streptomycin—0.50 to 1 gm., chloromycetin—0.50 to 1 gm., aureomycin—0.50 to 1 gm., or terramycin—1 gm. Assisting measures are: rehydration, repeated transfusions, protein and vitamin supplies, plaster immobilization, incision of abscesses, and sequestrectomies. Aureomycin and terramycin are less effective, but confining the routine procedure to the use of penicillin only is a grave error. When the sensitivity tests are nonconclusive the use of a combination of streptomycin and chloromycetin is the method of choice. Sometimes, especially when polyarticular involvement is present, ACTH may be used.

On the basis of 115 cases the author comes to the following conclusions: (1) antibiotics alone cannot solve the osteomyelitis problem, (2) the resistance against penicillin has increased during the past years: therefore, sensitivity tests against other antibiotics are most important, and (3) surgery cannot be discarded.

In the discussion LAURENCE stated that among 54 cases of osteomyelitis, 9 were sensitive and 4 were resistant to aureomycin, 10 sensitive to terramycin and 1 resistant, 7 sensitive to chloromycin and 6 resistant, and 10 sensitive to streptomycin. He therefore prefers streptomycin, eventually with terramycin, aureomycin, or penicillin.

ERNEST H. BETTMANN, M.D.

Rare Location of Osteochondritis Dissecans with Particular Consideration of Its Cause (Seltene Lokalisationen der Osteochondritis dissecans unter besonderer Berueckschichtigung ihrer Genese). HERMANN KARCHER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 271: 449.

Osteochondritis dissecans is most frequently found in the knee joint, affecting the medial femoral condyles, and in the elbow, affecting particularly the capitellum of the humerus. Generally there are three stages of osteochondritis dissecans: (1) a focus of aseptic necrosis in the subchondral area with preservation of the bony parts and discoloration of the overlying cartilage, (2) an increasing amount of excavation of the affected part with separation of a small portion of the subchondral bony plate (operations performed in this stage reveal a small process still attached to the healthy bony tissue), and (3) complete separation of the necrotic bony parts. The area is separated from the healthy trabeculae by a layer of fibrous tissue. In cases in which the sequestrum leaves its bed, it appears within a joint as a loose body.

The x-ray examination in the first stage of osteochondritis dissecans reveals a thin indistinct rarefaction along the line of demarcation. The x-ray diagnosis in the second and third stages is quite typical. Clinically, symptoms are observed particularly in the second and third stages of the disease.

Joints in which the two parts are rather incongruous, for instance, a round head articulating with a rather flat surface, are particularly prone to the de-

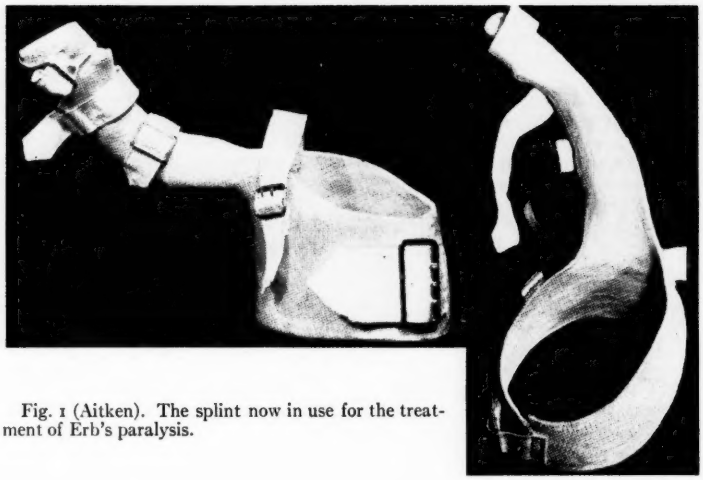


Fig. 1 (Aitken). The splint now in use for the treatment of Erb's paralysis.

velopment of osteochondritis dissecans. The point of contact in these joints is relatively small and the pressure exerted on the small area is therefore considerable. This applies particularly to the elbow joint between the capitellum and the head of the radius. Osteochondritis dissecans was diagnosed in a 16 year old carpenter. Instead of being given the accepted method of surgical treatment, the arm was immobilized in plaster for about 8 weeks, after which time the patient was allowed to return to work. The elbow was re-examined 1½ years after the onset of the disease and it was found that the focus had completely disappeared and that the patient was asymptomatic on clinical and x-ray examination.

Another case of a 16 year old boy who had osteochondritis of the medial aspect of the talus is cited. The patient responded very favorably to conservative management. A case of osteochondritis dissecans of the femoral head was reported. The focus was located on the medial aspect of the head, somewhat inferior to the central fovea.

A 20 year old male had been complaining of pain in the knee for about 13 years. He was treated for 1 year without any improvement. A roentgenogram of his pelvis was then taken and it revealed osteochondritis dissecans of the head of the femur on the same side. The author mentions another case of osteochondritis of the head of the femur which was asymptomatic until the patient was 21 years old and then he complained of pain in the affected hip joint. In contrast to most other joints, the hip joint with osteochondritis dissecans usually is not prone to develop joint mice.

Osteochondritis dissecans was described for the first time by Koenig about 60 years ago. Later on several factors were considered as the cause of osteochondritis dissecans; these were trauma, and vascular disturbances due to spasm or emboli. In 1934 Fromme suggested that the primary cause of osteochondritis dissecans was traumatic interference and he believed that Looser's zones were responsible for it. The location of osteochondritis dissecans is usually in a typical spot within the joint space. The continuous trauma to one particular spot of the joint surface finally causes fatigue fractures of the bony parts and the overlying cartilage. Osteochondritis dissecans is caused by an extremely heavy burden upon the joint surface. It usually occurs in joints in which the points of contact between the parts are small. The abnormality of the joint itself may also be responsible. This particularly explains the occurence of osteochondritis dissecans in both joints.

GEORGE I. REISS, M.D.

Deformity of the Elbow Joint as a Sequel to Erb's Obstetrical Paralysis. JOHN AITKEN. *J. Bone Surg.*, 1952, 34-B: 352.

The hypothesis that nerve injury in growing children may result in alterations of bone growth and consequent deformity stimulated the author to study a large series of cases of Erb's obstetrical paralysis.

Eighty-seven patients with Erb's obstetrical paralysis were examined during this survey and a further 20 patients have been attended since the investigation began and are included in the series, bringing the total to 107 cases. The author reports 33 cases of bone deformity of the elbow region, an incidence of 30.8 per cent of the series.

The investigation revealed the following facts: the displacement of the radial head may be anterior or posterior; the former is a simple dislocation which may or may not be associated with Erb's paralysis; the latter starts as a subluxation but in the older child amounts to complete dislocation. The inci-

dence of the two types was 27 cases (25.4 per cent) of the posterior type and 6 cases (5.6 per cent) of the anterior type.

In this survey of 107 cases of Erb's paralysis, 27 instances of incipient or actual posterior dislocation of the upper end of the radius were discovered. The type of case in which the dislocation occurs is defined and the early clinical and roentgenographic signs of the displacement are described and illustrated. The probable causes—muscle imbalance and rigid splinting over a long period—are enumerated, and the prevention of the condition and remedies are suggested.

Progressive changes in the roentgenogram consisted of:

1. Clubbing of the upper radial metaphysis followed by notching of its anterior aspect. (It must be remembered that the epiphyses are translucent and changes in them will not be shown roentgenographically.) Increased ulnar curvature and slight backward displacement of the upper end of the radius are noted, and there is deficient growth of the bones as shown by the small capitular center. These changes are observed from birth up to 7 months.

2. As the age increases the radial displacement and ulnar curve become more marked and, in addition, the upper radial metaphysial line becomes oblique from the front backward and upward because of spreading of the notch in a distal direction. A second curve, concave posteriorly, appears in the distal part of the ulna and this is in line with the posteriorly displaced radial axis.

3. Between the ages of 5 and 8 years the head becomes completely dislocated. The radius appears much too long and the capitular center begins to flatten at the point where it articulates with the displaced head.

4. Finally, between the ages of 8 and 14 years, a conical epiphysial center appears for the radial head and this articulates with the flattened capitulum by its anterior surface.

From his observations the author assumes that the deformities were caused by forcing the upper limb (some muscles of which were spastic and others, paralyzed) into a too fully "corrected" position imposed by the Fairbank type of splint, and by retaining it in this position over an unduly long period. The subluxation is thus gradually produced by bone growth and by relative contracture of the pronator and allied structures, one of which is the interosseous membrane, which now reverses its role and tightens on supination because of the posterior displacement of the radial axis (Patrick, 1946). This alteration in the function of the interosseous membrane causes the ulna to become curved in its distal part (to which the membrane is attached) by traction during supination and pronation. The double curvature then makes the ulna relatively shorter than the radius, which consequently appears too long.

It is suggested that traction on the hands by the obstetrician is a factor in anterior dislocation.

C. Fred Goeringer, M.D.

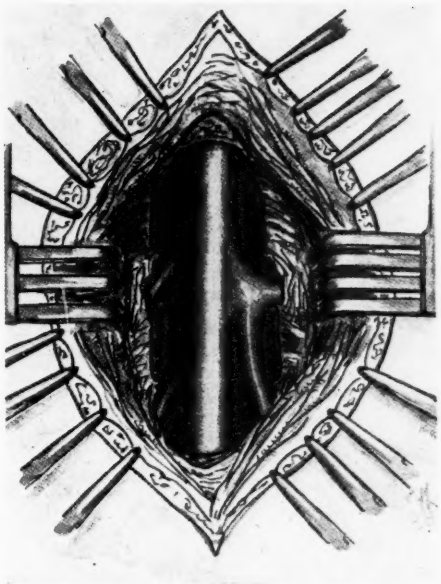


Fig. 1 (Ethelberg, Riishede). Abnormal dural sac containing fifth lumbar and first sacral roots on the right.

Malformation of the Lumbar Spinal Roots and Sheaths in the Causation of Low Backache and Sciatica. Sven Ethelberg and John Riishede. *J. Bone Surg.*, 1952, 34-B: 442.

The authors reported 4 cases of malformations of the lumbar roots and sheaths. No similar case reports were found describing such malformations with low back pain and sciatica (Figs. 1 and 2).

In case 1 myelography showed an incomplete hold-up of the contrast medium at the level of the lower border of the fourth lumbar body. There was no typical configuration of the radiopaque medium such as may be seen in intraspinal tumors or arachnoiditis. In this instance a second laminectomy was necessary and on opening of the dura the fifth lumbar and first sacral roots were lying separately, divided from the remaining roots by a thin membranous covering. When this was opened the roots of the cauda equina were seen to be the seat of a marked adhesive radiculitis. The lesion was classified as a malformation of the nerve roots and sheaths in the lumbar region, together with an adhesive radiculitis, which was not considered due to the iodized contrast medium. Two and a half years later the patient reported that the pain in the lumbar region and in the leg was unchanged and on examination there was marked stiffness of the lumbar spine and a mild lumbar scoliosis. Straight leg raising was limited and painful on the left, and there was slight wasting of the left leg. The sensory disorders were unchanged (Fig. 3).

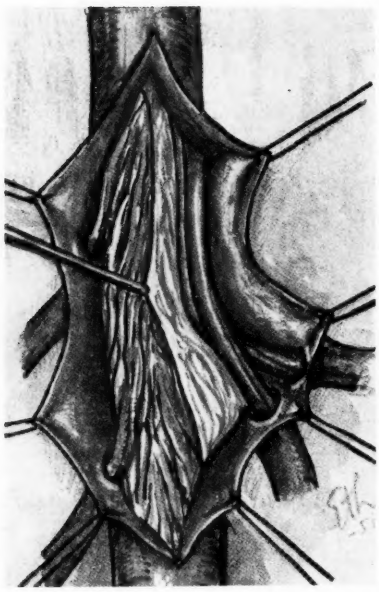


Fig. 2 (Ethelberg, Riishede). The same case with the dura opened. Abnormal roots shielded from the cauda equina by a thin arachnoidal layer. Adhesions between the roots of the cauda equina.

Fig. 3 (Ethelberg, Riishede). Case 2. Plexiform connection between fifth lumbar and first sacral roots. Caudally a thin second sacral nerve is seen.

In case 2 myelography showed defective filling of the fifth lumbar root sheath on the right side. A diagnosis of herniation of the fourth lumbar intervertebral disc was made. Despite removal of the disc herniation, symptoms persisted and a second myelogram showed a defective filling on the left side at the level of the fifth lumbar intervertebral disc. The patient was thought to have a herniation of the fifth lumbar intervertebral disc or a recurrent herniation of the fourth. The fifth lumbar and first sacral roots emerged from a common dural sheath. This sheath was a little more than twice as thick as a normal root with coverings. It coursed caudally to the level of the fifth lumbar intervertebral disc where it split up into two separate roots. Both roots left the spinal canal through the fifth lumbar intervertebral foramen. No root was found in the fourth foramen. The dura was left unopened. The abnormal roots were satisfactorily decompressed. Five months after the operation the patient had no complaints. She had returned to work.

All the patients with malformation of the lumbar roots and sheaths gave histories indistinguishable from those of herniated intervertebral disc. The history was long, the course intermittent, and the initial symptom of pain in the small of the back was eventually followed by pain in the leg. It should be noted, however, that the findings on neurological examination were more marked than is usual in cases of intervertebral disc herniation. Although in some cases of disc prolapse similar changes may develop, the occurrence in the cases reported here of weakness or dorsiflexion of the foot and the loss of sensation is striking. Furthermore, it is noteworthy that the straight leg raising test was so commonly negative. As compared with herniation of the lumbar intervertebral disc, the frequency of clinically significant anomalies of the nerve roots is low; only these 4 cases were found among 1,162 cases of lumbar laminectomy from April, 1943 until July, 1951. These anomalies are much less common than are lumbar spinal neurinomas, which were found in 25 cases during the same period of time.

C. Fred Goeringer, M.D.

Congenital Dysplasia of the Hip; Comments (Displasia congenita de la cadera; comentarios). Eugenio Diaz Bordeu. *Hosp. Roberto del Rio*, Santiago, 1952, p. 7.

The total material here considered consists of 349 observed examples of congenital dysplasia of the hip joint. The homogeneity of this material is more or less assured by the fact that the author, who succeeded to the work of his father (Prof. Dr. Eugenio Diaz Lira) 15 years ago, is able to compare his results with patients similarly treated as long as 30 years ago. The text is illustrated with 116 reproductions, most of them from roentgenograms. In fact,

21 of the 86 pages contain nothing but illustrations and their appended legends. Another 9 pages is occupied by the bibliography.

The diagnosis of this condition is, of course, obvious when Calot's maneuver can be elicited. Generally, however, dependence will have to be placed on the roentgenogram. The author has not obtained much assistance from arthrography with injections of opaque substances; however, in his opinion the method is harmless. In cases in which the diagnosis can be made very early, the treatment is simple and has the best chance of procuring permanent results. In instances in which the anomaly runs in the family, or in which the deficiencies characteristic of the joint surfaces and other structures can be recognized, it may be sufficient simply to instruct the mother in maintaining the child, at least for certain periods of the day, with the lower extremities abducted and rotated externally (90 degrees—Lorenz' first position), perhaps with some sort of cushion or other form of guard between the limbs.

The neglected or tardily diagnosed case may, of course, require the wearing of a cast, after manual replacement. Here the author uses only two positions: the first, or Lorenz position, as described above, and the second position, that of having the thighs rotated medially, an abduction of 45 degrees, and the hip joint somewhat flexed.

Open surgery on the dysplasic, perhaps dislocated, hip-joint is with the author a procedure of last resort. In the present material, this was done 36 times. The author is not enthusiastic about the results so procured. It is estimated that in 12 of these patients the operation produced good results, in 7 the results were mediocre, and in the remaining 17 patients the results were not good. These are, of course, the older patients with established deformities of the cotyloid cavity, head of the femur, and the accessory ligaments and muscles.

One of the most bothersome complications of the neglected case is the anteversion of the femur. There seems to be a general feeling among orthopedists that if the joint be properly set and maintained, the anteversion will correct itself. The author finds that in his material this deformity did not correct itself in more than one-half of instances. He is thus more anxious than ever not to permit the condition to progress to the point where the anteversion becomes established.

In general, the author recommends a careful study of the hip joints in every child who is slow in starting to walk, who presents other anomalies of the locomotor apparatus, or who has a family history of the defect. Treatment of every one of these children (when brought to the orthopedist) demands a careful study of the younger children of the family. The prognosis in these children depends upon the capacity for regeneration of the cotyloid cavity, particularly of its roof, and this capacity diminishes rather rapidly from infancy on.

It is, however, surprising on the whole how much regeneration will take place. The roof of the cotyloid cavity will develop bony spicules extending out from the atrophic superior protruding portion of the facies lunata; these spicules will apparently thicken and eventually build up a heavy bony projection or regenerated roof of the cotyloid cavity. In this region, just as in the case of the femoral epiphysis, the appearance of atypical processes of development does not necessarily give an unfavorable prognosis; quite the contrary in most instances. The fragmentary appearing, stunted, irregularly developing processes will often, with the years, develop into almost normal-appearing structures with absolutely normal power of function. Since, however, there is no means of determining which of these processes will correct itself, indeed, since the etiology of such behavior is unknown, it is not well to delay treatment, or decision with reference to the diagnosis of the child's condition, beyond the earliest period at which treatment can be initiated.

JOHN W. BRENNAN, M.D.

Structural Changes at the Hip Joint after the Reduction of Congenital Hip Luxation (Umbauvorgaenge am Hueftgelenk nach Einrenkung der angeborenen Hueftluxation). JOHANN BOESCH. *Zschr. Orthop.*, 1952, 82: 9.

In a series of 316 congenital hip luxations the author investigated the structural changes in the femoral head and neck and in the acetabulum which occurred after reduction. Some degree of anatomical change in the head was present in 196 (63.7%) of these 316 cases. A later examination, made 3 to 5 years after the reduction, showed that only 26.5 per cent of the cases that originally had undergone changes presented anatomically normal heads in the x-ray film. The earlier in life the reduction had been performed the more normal was the development of the head and the acetabulum. Marked changes in the femoral neck always led to coxa vara. The angle of the neck was more acute than normal in 74.6 per cent of the cases. WERNER M. SOLMITZ, M.D.

Hallux Valgus. R. H. HARDY and J. C. R. CLAPHAM. *Lancet*, Lond., 1952, 262: 1180.

Almost nothing is known of the etiology of hallux valgus. It is supposed to be associated with metatarsus primus varus, and this has been borne out by measurements on Canadian troops (Harris and Beath 1947). A close correlation has been shown between the degree of displacement of the great toe and the size of the angle between the first two metatarsals.

Observations were made on four groups of patients, namely, children of 4 to 5 years and of 14 to 15 years, adults suffering from symptomatic bunions, and a control group of adults. The similarity between the children and the adult controls suggests that they are members of the same statistical population, whereas the degree of hallux valgus and the size of the intermetatarsal angle in the morbid group were so clearly in a class by themselves that they can probably be regarded as forming an abnormal group.

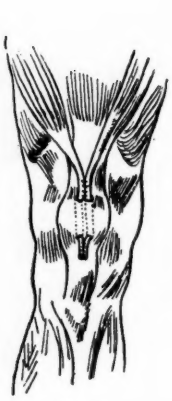


Fig. 1.

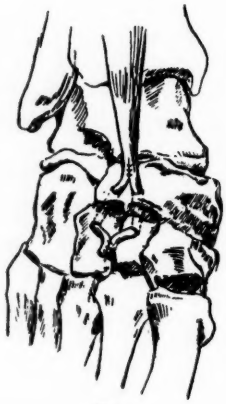


Fig. 2.

Fig. 1 (Conforty). Proposed method of fixing the flexors of the knee joint to the patella.

Fig. 2. Fixation of a single tendon, by threading through two bony canals, according to the proposed method.

For this study a standard roentgenographic method with suitable x-ray control was utilized. It has been suggested that some factor (possibly tight shoes) causes a lateral displacement of the terminal phalanx of the great toe. Because of this the pull of the tendon of the extensor hallucis longus, inserted into this phalanx, is transferred to the lateral side of the axis of the toe. The figures for children and adult controls show that the increase in the displacement of the great toe occurs largely before the age of 14, and the increase in the intermetatarsal angle occurs largely after the age of 15. The decrease in the deviation of the terminal phalanx takes place before the age of 15, i.e., during the time that the hallux valgus is increasing.

Evidence from standard roentgenographs of the feet of 1,851 school children suggests that the deformity of hallux valgus precedes the widening of the first intermetatarsal angle. A congenital widening of the intermetatarsal angle may not be as important in hallux valgus formation as has been thought.

As to what causes the displacement of the great toe in the first place, the authors noted that in children a marked lateral displacement of the terminal phalanx upon the proximal, which was higher in the 4 to 5 year group than in the 14 to 15 year group, higher in children than in adults, and higher in all groups together (except the morbid one) than in the morbid group itself. At no age was there a significant positive correlation between this displacement and the lateral displacement of the whole toe, i.e., hallux valgus.

In view of the fact that cases of hallux valgus deformity are noted among barefoot people, it is concluded that factors influencing the position of the great toe must be sought elsewhere than in skeletal patterns and ill-designed footwear, although the role of the latter in producing symptoms is hard to deny.

C. Fred Goeringer, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

A New Technique for the Fixation of Tendons to Bones. (In Bulgarian) B. Conforty. *Chirurgia*, Sofia, 1952, 5: 84.

At the Institute for Specialization and Postgraduate Training of Physicians in Orthopedic Surgery and Traumatology in Sofia, Bulgaria, work has been done for some time in an attempt to find a better method of fixing transferred tendons to the recipient bone tissue. All previously published methods seem to have disadvantages; they are either too complicated or they do not offer sufficient security of fixation.

The method here proposed has been found to overcome all objections, and has been used with invarying success in a sufficient number of patients to warrant its publication. This method seems to be essentially a modification of the procedure in which the tendon end is passed through a transverse canal in the bone and then brought back and stitched upon itself. It is difficult for the surgeon to obtain the proper direction and type of canal and a greater length of tendon than is at the surgeon's disposal is usually required.

In the modification of the method the described formation of a closed loop passing entirely through the bone, to which the tendon is to be fixed, is obviated in two ways, or more correctly, perhaps, the method represents two variations of the same method. If two or more tendons are to be transferred, as, for example, the transplantation of the tendons of the biceps femoris and the semitendinosus muscles into the patella, two canals are bored longitudinally through the body of the patella, parallel to each other and about 1 cm. apart. The end of each tendon is then threaded through the canal on its side and, immediately after emerging, the two ends of the tendon are brought together and sutured. The two tendons are also sutured together immediately before they enter the canals (Fig. 1). Wire sutures may be used and removed through the skin as in the method of Bunnel.

If only 1 tendon is to be transplanted, practically the same technique is used. The tendon is split longitudinally into two halves. The end of each half is then passed through its canal and sutured at the points of ingress and of emergence (Fig. 2).

The method has the following advantages: (1) it is simple of execution, (2) it ensures a positive and fine incorporation of the tendons into the bone tissue, (3) the fixation is firm and certain, because of the dividing wall of bone between the two canals which offers a firm anchorage for the tendon loop, and (4) the method is considered to be applicable to any part of the body.

John W. Brennan, M.D.

An Operative Extracapsular Technique in the Resections of the Elbow Joint (In Bulgarian). B. CONFORTY. *Chirurgia*, Sofia, 1952, 5: 275.

The author, assistant in Boytchev's clinic, thinks that the classic technique of extracapsular resection of the elbow joint according to Bardenheuer is not rationally conceived, because it practices economy at the expense of later joint mobility. On the author's service a technique of elbow joint resection has been developed, which combines the two advantages of intracapsular and of more extensive resection; this assures both the avoidance of contact of the healthy with the diseased tissues and promises an ultimately greater mobility of the resected joint.

The skin incision is the posterior midline incision of Farabeuf. This incision is diverted slightly toward the radial side to avoid its passing directly over the olecranon. It extends a hand's breadth above and below the olecranon. The fibers of the triceps are separated longitudinally and the incision is extended through the periosteum, an attempt being made to leave as much periosteum as possible. The humerus is resected at the classical level (supraepitrochlear) with care to avoid opening of the capsule (Fig. 1a).

The surgeon now turns his attention to the anterior aspect of the joint. The soft tissues are easily separated here and the ulna is cut through with the chisel not far below the coronoid process. The radius is resected at the level of the surgical neck (collum radii) (Fig. 1b). The bone complex, including the joint itself, and such soft tissues as are involved in the disease process are removed en masse. The resected specimen is from 5 to 8 cm. in length. The edges of the remaining bone ends are smoothed down, the musculoperiosteal flaps are approximated and sutured, and, finally, the skin is closed and the limb encased in a plaster cast, the elbow at right angles and the forearm midway between pronation and supination.

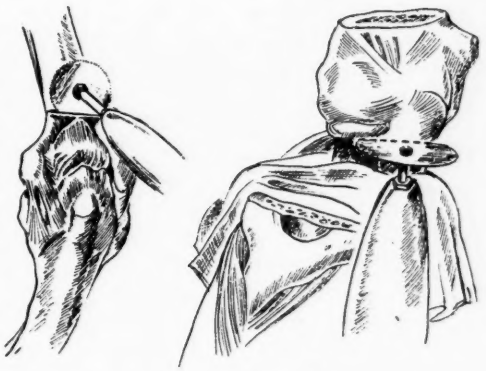
Active mobilization begins as soon as possible, however, not sooner than 1 month after the operation. The final mobility attained will depend much upon the will power and the patience of the patient.

So far 3 resections have been done with this technique; however, the ease of performance and the results obtained have made the procedure routine in the author's clinic.

Advantages of the method are: (1) avoidance of contact between healthy and diseased tissues, (2) the single shock-producing moment of the one-stage operation and avoidance of further shock from opening of the joint itself, (3) the avoidance of the danger of leaving unresected portions of the capsule, and (4) the combining of wide resection and intracapsular technique. JOHN W. BRENNAN, M.D.

Autoplastic Reconstruction of the Thumb (Reconstruction du pouce par la méthode autoplastique). MAURICE PIERRE, MICHEL CARCASSONNE, and HENRI GUASCONI. *J. chir.*, Par., 1952, 68: 449.

Three procedures have been employed for reconstruction of the thumb: (1) phalangization of the first metacarpal, (2) replacement by another finger (index finger), and (3) autoplastics.



a b

Fig. 1 (Conforty). Technique of intracapsular resection of the elbow joint.

The choice depends upon the anatomical changes and the social status of the patient. If the first metacarpal is not completely preserved the second metacarpal can be transferred. In the latter case the gross power is less but the precision is preserved. The autoplastic reconstruction of a thumb is the method of choice. There are three approaches:

1. Skin grafts followed by bone implantation with creation of a skin tube sutured to the base of the stump, fixed to the abdominal or thoracic wall, and irrigated frequently. After separation of the pedicle a few weeks later when the organization of the cuff is finished, a bone strut, either from the tibia or the iliac crest, is introduced; this unites with its proximal end to the rest of the bony thumb stump.

2. Skin grafting combined with bone grafting in one-stage.

3. Skin grafting and bone grafting after preliminary bone transplantation.

The authors describe 2 cases in which the following procedure was used:

A skin tube was formed and attached to the left iliac region. Three weeks later the pedicle proximal to the tube was united with the freshened thumb stump. Five weeks later, after elastic compression, a distal section of the pedicle was done at the tube. After 3 months a bone strut from the iliac crest was introduced and united with the first metacarpal, then plaster immobilization was maintained for 3 weeks. A short, painless thumb was obtained; it moved at the trapezoid metacarpal joint. This thumb was equivalent to a normal thumb amputated at the interphalangeal joint.

Complications are gangrene and sequestration of the bone graft. The author outlines painstakingly the various steps of his operative method.

ERNEST H. BETTMANN, M.D.

Experiences with the Acrylite Prosthesis in the Plastic Reconstruction of the Hip Joint (Erfahrungen mit der plastischen Wiederherstellung des Huftgelenks mit Kunstharzendoprothese). KARL CHIARI. *Zschr. Orthop.*, 1952, 82: 30.

A painless arthrodesed hip joint in flexion of 150 degrees with a mobile hip opposite and a mobile lumbar spine has been the safest arrangement for reconstruction of the hip joint until the introduction of the "Judet prosthesis." The author has used a similar modification, stressing the importance of a small head and exact fixation between the endoprosthesis and the cervical neck. A 70 mm. long and 10 mm. wide-edged stem secures an improved valgus position.

The following facts are cited in favor of the replacement prosthesis as against the vitallium cap: 1. It can be used for destruction of the head and neck. 2. There is no need for elaborate acetabular surgery. 3. The periostal covering of the neck can be maintained without the complication of necrotic changes as observed under the vitallium cap. 4. The joint capsule can be closed over the prosthesis. 5. Early weight bearing is possible. 6. There is diminished danger of relaxation.

As to the original Judet technique, the author prefers resuture of the dissected rectus femoris to the anterior superior iliac spine between the sartorius and tensor fasciae which reduces the complication of nonoperative calcification. Separation of the gluteus muscles could be avoided. No plaster was necessary and with the maintenance of abduction and the internal rotation position, active exercises followed after the third week with resumption of weight bearing at the fifth week. With a resulting valgus position of 150 degrees, early walking without support and disappearance of the Trendelenburg phenomenon was obtained. Surgery was advised only when all conservative measures had failed. The cases with severe arthritic deformity (22) often required piecemeal removal of the impacted hypertrophied head or preliminary osteotomy of the neck. The resuturing and preservation of the capsule to ensure the synovial cavity is important.

In cases of congenital dislocation with a shallow acetabulum, a deepening of the sockets shifts the joint more medially which will require less counterpull from the pelvifemoral muscles. A steeper and more favorable direction of the pelvifemoral muscles is secured by the valgus direction of the prosthesis and the lost length of the femoral neck can be substituted (16 cases). The results here are less favorable than in the first group. Three patients with nonunion showed better and earlier results than those treated by the classical methods (nailing osteotomy). One patient with a Charcot joint(?) could also be relieved. One case of Struempell-Marie ankylosis ended in failure.

In two thirds of 60 patients the follow-up examinations showed motion of 90 degrees within a period of 6 months to 2½ years.

ERNEST H. BETTMANN, M.D.

The Technique and Management of the Hindquarter Amputation. SIR GORDON GORDON-TAYLOR and ROBERT MONRO. *Brit. J. Surg.*, 1952, 39: 536.

The authors state that a series of 64 hindquarter amputations have been performed by the surgical staff of the Middlesex Hospital, London. Instruction in breathing exercises and penicillin and streptomycin therapy was started the day preceding the operation. Ten pints of matched blood were held in reserve. It was believed that unilateral spinal anesthesia was advisable. The incision was divided into the anterior and posterior portions. The many steps of the operation are described in detail.

It is thought that the technique of the division of the posterior segment of the pelvic girdle is quite important. The authors recommend: (1) elective ligation of the common iliac vessels, (2) division of the symphysis pubis prior to embarking on the posterior section of the girdle, and (3) use of a Gigli saw and avoidance of the chisel.

The postoperative management and complications are thoroughly discussed. The average postoperative hospitalization was 59 days. Postoperative retention of the urine was sometimes obstinate. The operative mortality was 22 per cent. The deaths were frequently due to shock and hemorrhage. Of the 64 patients subjected to amputation 25 are alive today with 12 additional surviving for more than 5 years. With 1 exception, all of these amputations were performed for malignant disease.

RICHARD J. BENNETT, JR., M.D.

FRACTURES AND DISLOCATIONS

Fold Cerclage and the Fold Tightener. A Contribution to the Problem of Operative Treatment of Fractures with Particular Reference to the Mechanobiologic Problems of Healing of Fractures and Stable Osteosynthesis of the Long Bones (Die Falz-Cerclage und der Falzspanner. Ein Beitrag zur Frage der operativen Knochenbruchbehandlung unter besonderer Berueecksichtigung mechanisch-biologischer Probleme der Bruchheilung und der stabilen Osteosynthese der langen Roehrenknochen). R. LEEMANN. *Helvet. chir. acta.* 1952, 19: 119.

Hippocrates aimed for a stable osteosynthesis by goldwiring in mandibular fractures. In 1710 White obtained optimal bony contact by freshening the fragments. Heine, in 1878, used a 3 cm. long ivory peck for bridging ulnar defects. While conservative and surgical methods are often competing, certain fractures (of the femoral neck, patella, olecranon) with femoral shaft nailing and bolted screw in malleolar fractures, are generally accepted surgical problems. To these the author adds the oblique and rotation fractures of the long bones for which cerclage (circular wiring) seems to offer therapeutic advantages. There is no special operative risk and the danger of infection is practically nil. V 2 A and vitallium cause no tissue irritation when mechanical rules are observed. The histological biochemical fracture healing takes its regular course via fibrin

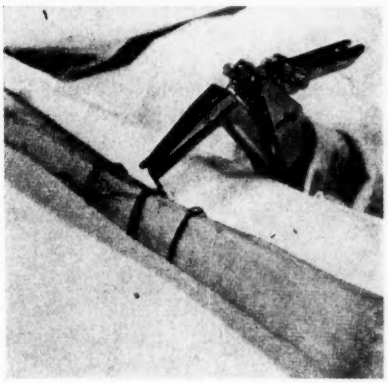


Fig. 1 (Leemann). Instrument.

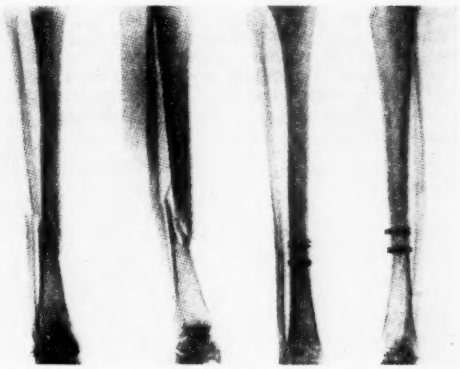


Fig. 2. Example of a folding cerclage in a case of oblique tibial fracture before and 10 weeks after operation, at which time patient was walking without support.

webbed hematoma, wound glue callus, granulation callus, osteoid, chondroid precallus, ending with the final bony callus. The condition for this cycle depends upon hormonal growth stimulation, the mechanism of which is still obscure, and on physicomechanical influences, which are the most important in bone healing.

Pressure creates callus while traction causes pseudarthrosis, and alternating pressure and traction promotes fibrous union.

In the first phase of granulation tissue absolute immobilization has to replace mechanical strain. In the second phase, with the change from early cartilage into osteoid, increased pressure is necessary, and in the endstage of differentiation, use of the limb is the physiological stimulus. The requirements for a physiological osteosynthesis are optimal stability and allowance for interfragmentary pressure. The lack of stability causes mechanical damage to the tissue by cavity formation, loosening with breakage, and delayed callus formation of inferior quality, and the irritated callus leads to pseudarthrosis. With interfragmentary pressure lacking the callus forms only very slowly because stimulation is lacking; the intensive adaptation lags and the bone wound cannot heal per primam.

Locking plates are considered a mechanical hindrance. All the requirements have not yet been met completely.

The cerclage is now carried out as the method of choice in diaphyseal fractures at the author's clinic. However, up to the present time inadequate fixation has caused frequent mechanical overstrain and cloudy irritated callus, which require more rigid plaster fixation. This applies to the classical method of wiring with twisting of the ends, which does not guarantee safe fixation. The author has devised a new method, "cerclage by folding" (Falz-Cerclage) and the handling of a special instrument, the "folding tightener" (Falz Spanner), which allows the fixation of bone fractures by tight wire loops knotted by being folded and hammered flush with the bone instead of being twisted. One millimeter of V 2 A wire is used for the tibia and humerus, as it can take stress of over 100 kgm.

The folding tightener fixes and closes the wire loops by excentric leverage and thus allows for control of the required tension by means of a dynamometer.

In elaborate mechanical stress tests, the author could prove that his new technique is much safer than and far superior to the previous used methods. In models the fixation remained stable after a weight of 20 kgm. was suspended 2,000 times, while with the previous wire fixation method, loosening and angulation occurred after 10 suspensions with 20 kgm. Also, in experiments with crutches which had been sawed through obliquely and fixed by various methods, the superiority of the new method could be proved objectively. The tension stays unchanged, the firmness of the knot withstands heavy functional stress, there is no corrosion and no secondary rupture, and the application is simple.

The incision is made over the anterior tibial border; after exact adaptation of the fracture fragments, the wire, arranged in hairpin shape, is placed subperiostally with the wire tension not exceeding 80 kgm. Penicillin-streptomycin solution is injected around the operative area and the extremity is elevated and immobilized for 2 to 3 weeks in plaster of Paris. For 6 days antibiotics and, if necessary, dicumarol for thrombosis prophylaxis are administered.

Summarizing, the author points out the fundamental rules of osteosynthesis as follows: (1) the ideal reduction of fractures, and (2) stable retention by firm osteosynthesis which should withstand formative and interfragmentary pressure.

Early functional mobilization should be aimed for, although standard rules have not been worked out as yet. ERNEST H. BETTMANN, M.D.

Report of Rare Fracture-Dislocation of the Epiphysis of the First Metatarsal Bone. Contribution to the Genesis of Aseptic Necrosis of the Epiphysis (Bericht ueber einen seltenen Verrenkungsbruch der Mittelfussepiphyse I als Beitrag zur Entstehung aseptischer Epiphysennekrosen). U. RITTER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 272: 269.

A miner sustained a complete separation of the epiphysis of the first right metatarsal head, with a 180 degree rotation, which was caused by a falling motor. The compound fracture-dislocation was reduced, the wound was sutured, and a plaster of paris cast was applied. A roentgenogram taken 6 weeks later showed a flattening of the injured epiphysis. A follow-up study 10 months later disclosed a considerable osseous bridge over the fracture line and disfigurement of the metatarsophalangeal articulation with arthrotic changes. There were no subjective symptoms and the patient was able to resume his work. Subchondral osteolysis was responsible for the flattening of the metatarsal head.

Interference with the local blood supply, leading to osseous necrosis, may be caused by numerous factors, such as a tear or contusion of a blood vessel in the course of trauma, a burn, exposure to cold, phosphorus poisoning, syphilis, tuberculosis, embolism, thrombosis, obliterating endangitis, and vitamin deficiency. Such conditions are able to provoke circumscribed aseptic necrosis of an epiphysis. Superimposed contributing factors, such as excessive demands on the affected region, static overloading or vibrations of the body caused by handling of compressed air tools, may transform such a necrosis into a disease called malacia. JOSEPH K. NARAT, M.D.

ORTHOPEDICS IN GENERAL

Generalized Fibrous Osteodystrophy—Recklinghausen—and the Kidney (Osteodystrophia fibrosa generalisata — Recklinghausen — und Niere). F. OEHLECKER. *Chirurg*, 1952, 23: 272.

In typical cases of Recklinghausen's disease, three conditions are found: (1) increased bone resorption with fibrous metaplasia of the medulla, often combined with benign giant cell tumors and bone cysts; (2) disturbances in the calcium and phosphorus metabolism; and (3) adenoma of one parathyroid gland.

The abnormally increased breakdown of bone tissue leads to excretion of large amounts of calcium and phosphates in the urine. This may cause either nephrolithiasis or, more frequently, formation of calcium deposits in the pyramids, especially in the collecting tubules (nephrocalcinosis). The obstruction of the tubules by these deposits results in severe renal damage and finally in necrosis of the involved nephron.

The author reports in detail the interesting case of a man 45 years of age who for years had been suffering pains in the thorax and in the back. Nine months previous to his admission to the hospital, a benign giant cell tumor had been removed from one femur. The examination at the time of admission revealed swelling and rarefaction of the ribs in the lateral areas, bone cysts of the iliac bone, a benign giant cell tumor in one metacarpal bone, and scattered shadows of calcification in the region of both kidneys. Blood chemistry studies showed elevated nonprotein nitrogen, uric acid, and calcium. The blood pressure was 165/90.

Surgical exploration of the parathyroids revealed an adenoma of the right lower gland of plum size. This was extirpated. After the operation the blood calcium level dropped to 5.9 mgm. per cent, and several episodes of tetany occurred which were successfully treated with calcium intravenously, and hydrated tachysterin given orally.

The effect of operation on the bone lesions was extremely beneficial; the distressing pains in the bones disappeared, and follow-up roentgenograms showed considerable improvement of the lesions in the ribs and the pelvis; however, the renal disturbances persisted, the nonurea nitrogen and the blood pressure rose gradually, and the patient expired of uremia 3 years after the operation.

The autopsy showed marked diminution of the calcium content in all bones. The kidneys showed calcium incrustations in the papillae, calcium deposits in the interstitial tissue, and necrosis of many nephrons with hyaline degeneration of the glomeruli.

Other cases in the literature are reviewed, in which removal of a parathyroid adenoma was followed by marked improvement although not complete cure of Recklinghausen's disease. In the typical cases the blood calcium level was elevated (up to 23 mgm. per cent in one case), and the excretion of calcium and phosphates in the urine was extremely high.

After removal of a parathyroid adenoma the blood calcium should be watched closely, and if the level drops to or below 7 mgm. per cent, either parahormone or tachysterin should be given. The author prefers the latter because it is administered orally and is much cheaper than parahormone. The control of blood calcium should be continued during the treatment because of the danger of overcompensation and hypercalcemia.

The relation between hyperparathyroidism, nephrolithiasis or nephrocalcinosis, and bone disturbances is discussed at length, and the literature concerning this question is reviewed. Whether an adenoma of one parathyroid gland is the primary cause of Recklinghausen's disease, or whether it develops as a complication of a primary disturbance of the skeletal system is still an open question.

WERNER M. SOLMITZ, M.D.

Principles and Experiences with the Implantation of Os Purum, Os Novum, and Bone Granulate. SVANTE ORELL. *Acta orthop. belg.*, 1952, 18: 162.

The author states that the normal formation of new bone occurs in the interstices between the bone

fragments, and that, in all probability, the regeneration and absorption of bone is a surface effect. Finely divided bone seems to be the best grafting material for surgical use because of its small interstices which at implantation are filled with blood and plasma, and the proliferating connective tissue cells that grow into the fibrin network and are excited to abundant new bone formation by the peripheral stimulation zones of the bone fragments. Homoplastic bone stored according to the deep freezing method in bone banks is easily obtained and available.

To obtain a sufficient amount of material from the bone banks, bone from autopsy cases can be saved. A bone material, which is known as homoplastic bone granulate is ground in a specially constructed mincer. This finely divided bone material has many advantages, not only with regard to regeneration but also from a technical surgical point of view. In regard to regeneration, its advantage is that the intervals between the bone particles are small and that the osteogenetic effect of the transplanted bone, which proceeds mainly from the surface of the graft, is greater because the more there is of such bone fragments in the area, the larger is their total surface. From a technical surgical point of view the granulate is easy to work with, particularly when bank bone is to be used.

Case reports with illustrative photographs are given. C. Fred Goeringer, M.D.

Rheumatoid Granulomatous Nodules as Destructive Lesions of the Vertebrae. Archie H. Baggenstoss, William H. Bickel, and L. Emmerson Ward. *J. Bone. Surg.*, 1952, 34-A: 601.

In a case of rheumatoid arthritis, granulomatous nodules were observed clinically in the subcutaneous tissue and at autopsy in the synovial membranes, pericardium, myocardium, subchrondral bone, and vertebrae. The granulomatous process in the vertebrae in this case caused compression fracture of the twelfth thoracic vertebra and appeared similar roentgenographically to such other destructive lesions as multiple myeloma, metastatic carcinoma, and tuberculosis. This case, together with 3 others reported briefly, emphasizes the fact that the granulomatous inflammation which is so commonly observed in the subcutaneous tissues and occasionally in the viscera of patients with rheumatoid arthritis may also involve the vertebrae. This fact is important in the consideration of the differential diagnosis of destructive lesions of the vertebrae in patients with rheumatoid arthritis.

The Postmortem Influences upon the Fluid of the Cartilage of the Knee Joint. An Experimental Contribution to the Problem of Arthrosis Deformans (Die postmortale Beeinflussung des Wassergehaltes beim Kniegelenkknorpel). Bernd Langmaack. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 271: 496.

The author demonstrated that the fluid content of the cartilage of the knee joint is influenced by rigor mortis, i.e., the combination of pressure exerted by the weight of the extremity and the pressure of the ligaments about the joint. In considering, therefore, the cause of arthritic changes in the articulating cartilage several factors must be studied, for instance the condition of the air, the time at which these cartilage pieces are removed, and, particularly, the postmortem pressure exerted upon the cartilages. The loss of fluid due to pressure and the reabsorption of water after cessation of the pressure on the articulating cartilage are very important reactions that most likely occur in the normal use of the articulating surfaces. George I. Reiss, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

The Repair of Aortic Defects with Heterotopic Osteogenic Transplants of Ureter and Renal Pelvis (Sulla riparazione di difetti dell'aorta mediante innesti eterotopici osteogenici di uretere e bacinetto renale). G. MARCOZZI. *Ann. ital. chir.*, 1952, 29: 92.

It has been known for many years that heterotopic transplants taken from the urinary tract (renal pelvis, ureter, or bladder) may induce a more or less pronounced osteogenic reaction resulting in the formation of bone, sometimes at the most unusual sites. In an attempt to produce such bone formation around aortic lesions, the author covered portions of this very vessel with fragments of ureter and renal pelvis. The experiment was carried out on 8 dogs. A segment of abdominal aorta, approximately 4 cm. long, was dissected free, and in 4 dogs the adventitia as well as the media was scraped from a 1 to 2 cm. long portion of the main blood vessel. This aortic segment was then covered with a fragment of ureter or renal pelvis.

The animals were killed after a period ranging from 30 to 60 days, and the author found that in 5 out of 7 dogs (1 animal died after 6 days) definite osteoplastic reactions were present. The formation of bone, however, was not uniform, but consisted of islands and lamellae of bone which were surrounded by newly formed connective tissue. The zones of ossification, furthermore, were interrupted by cystic cavities, the interior of which were lined by epithelium of the urinary tract. The osteogenic cuff, therefore, had to be considered as unsatisfactory and too weak.

A certain number of illustrations are added to the extensive discussion of the various histological characteristics related to the process of heteroplastic ossification. R. SCHOBINGER VON SCHOWINGEN, M.D.

Resection of Combined Aneurysm and Coarctation of the Aorta with Insertion of a Homograft. R. C. BROCK and A. J. P. GRAHAM. *Guy's Hosp. Rep.*, Lond., 1952, 101: 207.

The authors describe a case of Alexander and Byron in 1944 in which a combined coarctation and aneurysm of the descending thoracic aorta was resected and both ends of the aorta were closed by suture in as much as the gap between the ends could not be bridged. Later, in 1951, Lam and Aram resected a syphilitic aneurysm of the descending aorta and inserted a homograft 5½ inches long. Although the result was eventually unsuccessful, this case is thought to be of great practical and historic importance because, in the absence of a good collateral circulation, the patient suffered some damage of the spinal cord.

The authors report the case of a male, aged 28, in whom coarctation of the aorta was diagnosed. At operation no coarctation at the usual site was found, but instead there was a large calcified aortic aneurysm about 5 cm. above the diaphragm. Below it there was considerable aortic narrowing at the distal limit of the aneurysm. The operation was abandoned because it was impossible to close the long gap necessitated by the resection. After considerable work in the experimental laboratory with the preservation of aortic homografts the patient was readmitted, at this time aged 31 and with a slow steady deterioration of his clinical condition. The aortic graft had been preserved 19 days and cultures of the nutrient medium were sterile. The aorta was clamped above and below the aneurysm and the diseased segment was removed to leave a gap measuring approximately 12.75 cm. The clamps were on the aorta for a total of 80 minutes during which time the homograft was inserted. While the clamps were in place the blood pressure rose 15 points to 170 mm. systolic and remained at that level. Pulses which were just barely palpable in the lower limbs prior to operation were virtually normal after the operation and the patient spontaneously stated that his feet were no longer cold. The collateral vessels over the chest and abdomen diminished in size and the blood pressure on discharge was 130/80 mm. whereas its preoperative level had been 240/160 mm. of mercury in the right arm. The aneurysm at inspection was found to project mainly from the anterior surface of the aorta and to measure 6.5 by 5 by 5 cm. The aorta entering its upper end was 1 cm. in diameter whereas at the lower end the aortic lumen was only 0.25 cm. in diameter. Many calcified plaques and rough irregular calcified areas of vegetation with no actual thrombi were present on the interior of the aneurysm. A feature worthy of note is the fact that the aneurysm was above the level of coarctation in contrast to the cases already reported in which the aneurysm was at a lower level. The patient is reported to be working and symptom-free some 6 months after operation. ALLAN D. CALLOW, M.D.

Arterial Homografts: An Experimental Study. ALEXANDER J. P. GRAHAM. *Guy's Hosp. Rep.*, Lond., 1952, 101: 186.

The evolution of cardiovascular surgery has necessitated the development of facilities for the supply, preservation, and storage of vascular grafts. Because of the difficulties in obtaining suitable vessel segments there is an urgent need for the formation of blood vessel banks at suitable hospital centers. For the short term storage of grafts the author believes that Tyrode's solution is a suitable medium. For longer preservation this method is wasteful because of deterioration of the arterial segments. The author uses the balanced electrolyte solution or Hank's modification of Tyrode's solution as described by

Pierce. This is a physiologic solution closely related to blood plasma without the proteins but with added glucose, phenol-red, and a buffer.

In the author's series of experiments the thoracic aorta of medium-sized dogs was removed under aseptic technique, divided into segments varying from 1 to 3 cm. in length, soaked in sterile normal saline solution, and then transferred to small flasks containing the nutrient medium. Bacterial contamination was rarely found but fungus contamination occurred in about 10 per cent of the flasks. The greatest danger of contamination was thought to arise from air-borne infection. It was noted that when a vessel segment "died" it became soft, gelatinous, and necrotic. Dextran solution was found to be definitely inferior to the modified Tyrode's solution. Segments of aorta stored for periods up to 7 weeks retained their normal physical properties. They were not edematous nor were they unduly friable. Their elasticity appeared normal when they were stretched. It was concluded that for preservation of vessels up to 7 weeks the use of serum nutrient fluid provided a relatively reliable method.

The grafts were inserted into the abdominal aorta of medium-sized dogs with black braided No. 00000 silk. The diameter of the grafts employed ranged from 0.4 to 1 cm. No anticoagulants or other special care was given postoperatively. The grafts varied in their period of preservation from 27 to 49 days and were left in place from 5 hours to 154 days. All except 2 of the grafts were patent. Several had small or large mural thrombi, but most of them gave excellent function in so far as the lumen was concerned. Microscopically much of the endothelium was seen to have flaked off, but a rapid proliferation of intimal endothelium occurred from the edges of the recipient vessel to overgrow the thrombus present at the suture line and spread out onto the inner surface of the graft as a multilayer cellular intima. As a result of this ingrowth and of organization of the thrombi the intimal surface of the graft became lined by a fibrocellular epithelium which was many cells thick and varied greatly in depth and uniformity of structure, but by the end of 6 weeks its surface was smooth and the superficial cells were arranged parallel to the lumen. The media underwent fragmentation of the muscle with gradual replacement by a hyaline matrix. At the end of 35 days much of the media was acellular. In 5 months fragmentation of the elastic fibers had occurred. In the adventitia, initial changes included cellular infiltration with round cells and polymorphonuclear cells. The connective tissue sheath was invaded by fibroblasts and capillary roots from the surrounding tissues, and granulation tissue formed which gradually organized into a dense fibrous tissue replacing the adventitia. At the end of 5 months the intima was formed by a thickened fibrocellular layer which had developed into a type of endothelium, the muscle of the media was replaced by collagen, and the adventitia was reformed by organization of the granulation tissue.

This work largely confirms that of previous investigators. It was found that most complications likely to lead to failure of the graft occurred within the first 2 weeks of its insertion and if by the end of this time the graft was still patent, good function could be expected to continue. Failure was generally due to hemorrhage, rupture, or thrombosis, but it is believed that these factors can be reduced by increased skill. The fact that these histologic changes are more marked in preserved homografts than in fresh autografts has led to the suggestion that these changes in grafted segments are due to immunologic reactions. The author believes that there is little evidence to support this hypothesis because giant cells are absent except in relation to the paraffined suture material, and the gradual loss of cell nuclei in replacement fibrosis is no more than would be expected from the implantation of dead tissue in a similar situation. The author believes that for practical purposes immunological responses can safely be ignored. ALLAN D. CALLOW, M.D.

The Collateral Circulation after Ligation of the Inferior Vena Cava. Experimental Anatomo-radiological Study (Il circolo collaterale dopo la legatura della vena cava inferiore. Studio sperimentale anatomo-radiologico). M. BOGETTI and L. CASTELLO. *Boll. Soc. piemont. chir.*, 1952, 22: 451.

The authors, of the Surgical Department of the University of Turin, Italy, discuss experiments performed on a series of 23 rabbits to study the development of the collateral circulation after ligation of the inferior vena cava below the level of the renal veins.

In man this operation has been done successfully in certain cases of cardiac decompensation which could not be controlled by medical treatment. The intervention has the purpose of reducing the influx of blood volume per time unit to the right atrium. This causes lowering of the pressure in the right atrium and in the pulmonary artery, and counteracts congestion of the viscera proximally to the site of ligation, especially the liver and the kidney.

In the authors' experiments phlebograms were taken at different intervals after the ligation, from 1 hour to 6 months. A 70 per cent solution of ioduron was injected in the femoral vein. The dosage was 3.5 c.c. per kgm., the rate 4 c.c. per second, and the pictures were taken at the end of the injection.

For the anatomical studies the cadavers were fixed in 15 per cent formalin solution for 8 days before dissection, or they were rapidly frozen after injection of the dye in the venous system.

The phlebographic and anatomical investigations revealed three stages in the development of the collateral circulation. Immediately after the intervention and for the first few days intensive stasis and dilatation was observed in the entire venous system distally to the ligation. This phenomenon included even veins which, later on, did

not participate in the development of the collateral circulation, such as the vesical and genital plexuses, the caudal veins, and the distal intraspinal and perispinal plexuses. After the first week a new order of vicarious circulation developed gradually. The venous stasis diminished, the caliber of the veins became smaller as their tonus increased, and the valvular apparatus became effective.

In the beginning, the reflux to the heart takes place via the intraspinal and perispinal plexuses, the venous network of the abdominal wall, and the retroperitoneal veins of the lumbar region. Later on, the spinal plexuses lose their initial importance when other pathways progressively increase in caliber. After about 2 months a large portion of the blood flows from the iliac vein through the epigastric and internal mammary veins to the superior vena cava. The system of the azygos vein plays a minor role in the rabbit, in contrast to the condition in dogs and in man.

Beginning with the fourth month after the intervention, another important collateral system develops through the retroperitoneal lumbar veins which, by way of communicating branches, empty into the inferior vena cava proximally to the site of ligation. Thus, a considerable portion of the blood from the pelvis and the posterior extremities regains the normal route of reflux to the right heart via the inferior vena cava which, after the fourth month, resumes its normal caliber.

From these observations the authors conclude that the relief given to the heart by the ligation may last for a limited time only because after a certain interval (6 months in the rabbit) the vein is filled again by collaterals from the retroperitoneal veins, and the largest portion of the blood again flows directly to the right auricle.

WERNER M. SOLMITZ, M.D.

Development of the Venous Collateral Circulation and Its Promotion Through Damaging of the Chief Vein. A. BALAS, P. GÖRGO, L. RANKY, and J. STEFANICS. *J. internat. chir.*, Brux. 1952 12: 128.

Following injury to the intima of the femoral vein in dogs the development of venous collateral circulation was studied. The injury was produced with a sclerosing substance (thrombogen) of which 3 to 5 c.c. were intravenously injected. As a radiopaque substance, 3 to 4 c.c. of a 70 per cent ioduron solution were administered. Reparative processes were influenced by lumbar ganglionectomy and the intravenous injection of a 1 per cent novocain solution.

The injury is immediately followed by spasm of the main venous trunk and the collaterals. After thrombosis of the main trunk collateral spasm is marked; it is increased at the level of the thrombosed section (segmental spasm of the venous collaterals). During the acute stage of thrombosis, a spastic, delicate, and unarranged meshwork of collaterals starts from the distal part of the obturated section. This is termed "first phase" of the venous collateral circulation. Later, the meshwork undergoes arrangement, the vessels decrease in number and take a course corresponding to the direction of circulation. At the same time a wider and rather uninterrupted pathway displaying a convoluted course begins to develop. This is the "second phase" of the collateral venous circulation. Later on, the lumen of the pathway increases, collateral spasm decreases, and instead of more thin collaterals a trunk of greater caliber, called "a definitive collateral" by the authors, develops.

Recanalization is, as shown by clinical observations also, a harmful process. The formation of the collateral circulation can be efficaciously promoted by the intravenous administration of novocain, phlebectomy, and lumbar ganglionectomy. The best results are obtained if the two latter procedures are combined, as the residual venous collateral spasm is brought to a stop.

The development of the venous collateral circulation is a complex dynamical phenomenon which is capable of adapting itself to many accompanying factors. The phenomenon is a result of the form of the lesion, pathologic access, individual qualities, and the reflex effects on the sympathetic nervous system elicited from the vessels.

BENJAMIN GOLDMAN, M.D.

BLOOD; TRANSFUSION

The Present-Day Status of Blood Transfusion (Über den heutigen Stand der Bluttransfusion). H. WILLENEGGER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 271: 511.

The present-day development of blood transfusion stems from the introduction by Landsteiner, in 1901, of the ABO system of blood typing, and its later accrual of the AB type by Landsteiner's students, Decastello and Sturli. The method, however, was cumbersome and uncertain until the citrate of sodium was introduced as an anticoagulant. Today blood transfusion has risen from its lowly position as an insignificant branch of surgery to that of an independent science with its quota of full time research workers and consultants. Incidentally, the author lays upon the surgeon the obligation of providing from his patient-material the opportunity for theorists to test any type of transfusion with which they may wish to experiment.

The Swiss Red Cross undertook to provide blood bank facilities; however, altruism on the part of the public seems hardly to be sufficient. The plan was hit upon of letting each man provide his own blood for emergency purposes, the blood provided being available only to the donor; however, although this practice still seems necessary, it has led to a lot of discussion. A part of the problem of providing conserved blood for transfusions arises from the physician's practice of demanding habitually an Rh-negative, O-type of blood instead of trying to see if some other type might do in the individual instance.

The author regards the indication for blood transfusion to be any disproportion between the volume

of the vascular bed and the volume of blood occupying it. Here the chief consideration is restoration of the circulating fluid volume. It has been shown that 10 to 20 per cent of the erythrocyte volume is sufficient to maintain life, provided that sufficient fluid be supplied (plasma, etc.) to keep this volume of erythrocytes in circulation (Schoercher). However, in the giving of plasma for shock of war wounds, care should be exercised not to carry the idea of shock too far and forget that the amount of hemorrhage might render the transfusion of erythrocytes necessary. Of course, in the conception of shock in its usual connotation of peripheral collapse, the transfusion of plasma is undoubtedly preferable, as the transfusion of whole blood would perhaps disadvantageously increase the viscidity, and this same consideration would apply in 90 per cent (Braithwaite) of all burn cases, in which the loss is principally in the plasma fraction of the blood.

In the transfusions for the shock of hemorrhage, such as that resulting from hemorrhage on the operating table, it is apparently not always wise to wait for the bleeding to occur. The author emphasizes the advantages of prophylactic transfusions during the course of a long operation, and he appends a chart of an instance of severe hemorrhage during a pneumonectomy. In this case several prophylactic injections of 200 c.c. of blood enabled the patient to bear the operative hemorrhage without serious symptoms, while in the case of another pneumonectomy in which such transfusions were not practiced, the patient died of the hemorrhage despite the subsequent transfusion of enormous amounts of blood.

The author is of the opinion that in instances of emergency where the immediate transfusion of blood is essential, the double crossed method of blood typing give almost 100 per cent assurance. This test method seems to take care of everything except the Duffy system and perhaps the Coombs test. Of course, the Rh factor-D is to be considered; the surgeon should not sensitize an Rh-negative person by injecting Rh-positive blood. In this the Rh-positive factor-D is the most important (90 per cent of sensitizations). As a matter of fact no transference of blood from one individual to another is a matter of entire indifference; the author shows by the withdrawal of blood from the vein of the recipient, immediately after the transfusion, that there is always some evidence of disturbance in the blood mixture. Even with the blood of the universal donor (type O) there is marked agglutination of the recipient's erythrocytes, an agglutination which, however, is unstable, transient, and apparently without permanent harm to the recipient.

With reference to the possibility of transferring disease (syphilis, virus hepatitis), the author thinks that the best guarantee is the careful exclusion of the disease from the donor. It is believed that the addition of drugs (arsenic, antibiotics) to the blood to be transfused might have unexpected effects in instances of massive transfusions. This objection does not extend to the Witebsky substance as an addition to the blood to be transfused in cases in which there might be danger of hemolytic reaction.

In conclusion the author states that the surgeon, in looking back over the last 10 years, must conclude that the three fundamental factors in the surgical progress during this period are (1) the progress in anesthesia, (2) the antibiotics, and (3) the treatment of shock. The results obtained by employment of the last mentioned factor are to be ascribed to the progress in blood transfusion and, particularly, to the development of the technique of blood conservation. JOHN W. BRENNAN, M.D.

Intra-Arterial Transfusion. D. L. C. BINGHAM. *Lancet*, Lond., 1952, 263: 157.

Shock may be defined as that state which results when disparity arises between the volume of the vascular bed and the circulating blood volume. This may occur (1) when the circulating blood volume is rapidly reduced by hemorrhage, loss of plasma, or excessive loss of body fluids, and (2) when the volume of the vascular bed is rapidly increased as the result of widespread and rapid decrease in tone of small arteries, veins, and capillaries. In both groups the all-important sequel is inadequate filling of the vascular bed and rapid lowering of the blood pressure. Later, the circulating blood volume is increased by extraction of fluid from the tissue spaces, and the vascular-bed volume is reduced by an increase of tone in the small blood vessels and widespread contraction of the capillaries. Equality may thus be reestablished, and shock apparently overcome. This apparent recovery from shock is dangerously misleading and is often spoken of as the compensatory phase of shock, or "masked shock," and a patient who is operated on while in this phase, without preliminary blood transfusion, is in great danger of developing an overwhelming degree of shock from the additional trauma of the operation.

Another highly lethal set of circumstances may arise in the patient who has lost a substantial fraction of his blood volume but has wholly or partly overcome the initial depression of blood pressure by a compensatory mechanism, such as widespread constriction of small blood vessels. This state of enhanced vascular tone cannot be indefinitely sustained. Injurious metabolites accumulate in such relatively ischemic tissues until they reach a concentration at which they cause local vasodilatation, and probably also a generalized decrease in vascular tone. As a result the vascular bed volume begins to enlarge, and an increasing degree of disparity between it and the circulating blood volume arises. A vicious circle then develops which leads rapidly to irreversibility, a state in which peripheral vascular failure is so profound that pooling and laking of the remaining circulating blood in the relaxed vascular bed takes place, and transfusion, even in adequate amounts, is then unable to prevent the death of the patient.

Assuming that the heart can work properly, circulatory efficiency depends on the presence of a

normal blood volume, a normal vascular-bed volume, and normal tone or peripheral resistance in the vascular channels. Until recently, efforts to resuscitate patients in a state of shock have largely been directed towards restoring blood volume to normal by intravenous blood transfusion. It depends for its success on a substantial and increasing degree of tone in the smaller peripheral vascular channels, so that blood added to the blood volume intravenously will be returned to the heart and thus to the general circulation. If a reasonable degree of vascular tone is not present, blood which is given intravenously will largely accumulate in venous channels and capillaries and may, indeed, never pass through the heart and lungs to the arterial side of the circulation. Attempts to reduce the volume of the vascular bed with vasopressor drugs have been disappointing, and even deleterious in severe shock. A third alternative is available—that of increasing blood pressure rapidly to normal by intra-arterial transfusion at or above physiological pressures.

The introduction of blood into the arterial tree under pressure at about 120 mm. Hg., or slightly above this figure, causes the blood pressure within the whole arterial system to rise rapidly to normal. Intra-arteriolar and intracapillary pressure is restored; and perhaps pooled and laked blood, lurking in flaccid capillaries and venules, is pushed onwards into the great veins and so back to the heart, which is thus once again provided with blood to pump onwards.

Results of intra-arterial transfusion in shock are: (1) normal systolic blood pressure is restored throughout the whole arterial system almost at once; (2) the rate of blood-flow through all body tissues—notably the brain, the coronary vessels, the liver, and the kidneys—rises rapidly; (3) adequate tissue oxidation replaces gross and increasing tissue anoxia; (4) accumulating tissue metabolites are washed away to their sites of detoxication or excretion; (5) lost blood is replaced as easily and quickly as by the intravenous route.

Workers at Queens University, Ontario, Canada, have found that intra-arterial transfusion is much more effective than intravenous transfusion in the treatment of hemorrhagic shock, and that its advantages include immediate restoration of coronary, cerebral, and renal circulation to normal, and rapid return of blood pressure to normal. Clinically they now use intra-arterial transfusion both in the treatment of established shock and as a prophylactic measure in all major surgical operations (e.g., pneumonectomy, thoracolumbar sympathectomy, and major abdominal operations) which may be complicated by severe shock. The method and apparatus are described. Among the difficulties encountered were (1) leakage at the connections, and (2) ischemia of the radial half of the hand in 2 cases, relieved in one case by stellate block, and in the second case the terminal phalanx of the index finger was lost.

The authors conclude that in more than 100 cases, intra-arterial transfusion is far superior to intravenous transfusion, both in the treatment of established shock and as a preventive measure in operations in which serious shock is expected.

ALBERT M SCHWARTZ, M.D.

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Intracellular and Extracellular Potassium Deficits in Surgical Patients. ROBERT ELMAN, BURTON A. SHATZ, ROBERT E. KEATING, and THEODORE E. WEICHSELBAUM. *Ann. Surg.*, 1952, 136: 111.

Observations made by the authors on 36 patients with plasma potassium levels of below 3.0 mEq. per liter are recorded and discussed. Four of these cases are presented in detail to illustrate such deficiency and its correction. On the basis of these observations and from a review of the literature, certain conclusions are reached.

Potassium deficiency is commonly associated with persistent hypochloremia and alkalosis which responds poorly or not at all to isotonic or hypertonic sodium chloride solution and/or ammonium chloride. Clinical manifestations include muscular weakness, both of smooth and striated muscle, sensory depression, even to coma, and instability of the peripheral circulation.

The plasma potassium level is usually low in potassium deficiency. The plasma calcium level is also frequently low.

Losses of potassium occur in the urine and also in gastrointestinal discharges. Symptoms are produced only when the deficiency reaches more than 200 to 400 mEq. (15 to 30 gm. of potassium chloride). To produce symptoms, losses must be in excess of the potassium released by tissue protein breakdown on a nonprotein intake which may be calculated from the urinary nitrogen by using the ratio K/N = 2.9.

The amount of potassium needed to correct deficiency varies. The amount needed is small in patients in negative nitrogen balance, and large in those in positive nitrogen balance. The kidney does not conserve potassium, often losing 50 per cent or more. Consequently, twice as much as is deficient must be given to correct potassium deficiency.

A study of potassium balance is necessary to measure the degree of intracellular potassium deficit. As potassium is given to the deficient patient, correction of the intracellular deficit is indicated by sudden achievement of potassium balance.

Potassium administration is dangerous only when the plasma level is suddenly increased well above the normal. This can be avoided by giving it in solutions with a maximum concentration of 53 mEq. (4 gm. potassium chloride) per liter.

DONALD C. GEIST, M.D.

Variations of the Temporal Flap. HERBERT CONWAY, RICHARD B. STARK, and JOHN DUNN KAVANAUGH. *Plastic & Reconstr. Surg.*, 1952, 9: 410.

First the authors summarize the historical development of the temporal flap following its original use by Theodore Dunham, of New York, in 1893. They state that at present relatively few surgeons use the temporal flap in preferance to other regional flaps for the transfer of soft tissues from the forehead.

The authors advance the opinion that the technique of the temporal flap can be so refined that it will be the most efficacious facial flap for correction of defects of the face. Because of its abundant blood supply due to the incorporation of the temporal artery and vein, large amounts of tissue may be migrated in an immediate flap, even though the distal extremity of the flap extends as much as 3 cm. beyond the midline of the forehead. Early experience with the temporal flap showed considerable swelling of the flap. At first the swelling was thought to have been caused by division of the lymphatics. Later study showed that the swelling could be prevented by incorporating in the flap the inferior branch of the superficial temporal vein. This is accomplished by placing the inferior incision along the upper margin of the eyebrow, which, in addition to encompassing the inferior branch of the vein, is more ideal for ultimate cosmetic restoration of the forehead. The swelling thought to be due to lymphedema appears to have been caused by chronic passive congestion secondary to a deficient efferent circulation.

Eighteen cases are reported in which the temporal flap was used. The defects corrected by temporal flaps were located on the eyebrow (2 cases), orbital cavity (3 cases), nose (7 cases), cheek and nose (1 case), nose and lip (1 case), eyelid (2 cases), and scalp (2 cases). The cause of the defects was cancer (13 cases), trauma (4 cases), and osteomyelitis (1 case).

Arteriography was performed on a cadaver by the injection of thorium dioxide into the right common carotid artery. It was seen that the artery which contributes most to the blood supply of the soft tissues of the head and neck is the superficial temporal artery with its frontal and parietal branches.

WILLIAM T. FITTS, JR., M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Two French Cases of Severe Burns Treated with ACTH (Deux observations françaises de brulés graves traités par l'ACTH). C. AMOUDROU. *Sem. méd.*, Paris, 1952, 28: 54.

Results obtained with ACTH therapy in 2 cases of severe burns confirm the favorable reports of American writers. The effect on the clinical symptoms of shock is striking, while the blood changes are less marked. The toxemic phase lasting from the third to the fourteenth day is favorably affected. The hormone appears to exert an energizing and

euphorizing effect. Chloride and potassium balance seem likewise to respond to this treatment. Cicatrization was not delayed. Relatively large doses were required to effect tissue reparation, the quality of the regenerated tissue and the functional result being improved. However, the effect on grafts lauded by American writers could not be confirmed.

The first case reported was not extraordinary, but the second patient suffered electric burns of 45 to 47 per cent of the body surface and at least 18 per cent of these were of deep second degree or more. There was a large area of scarification—500 c.c. in the interscapular region and another large area in the right axillary and right lateral thoracic region. The patient was transported from the scene of accident for some 15 kilometers in a sterile sheet, with administration of 1 c.c. of morphine intravenously. Since clinical symptoms were still slight on admission, preventive shock therapy was possible. Hourly diuresis determinations were made to determine the rhythm of fluid therapy. Adequate diuresis, i.e., 35 c.c. per hour for the first 24 hours, was maintained with a minimum of intravenous fluid: 1,500 c.c. of plasma and 1 liter of electrolyte, as compared with the customary 5 to 7 liters of fluid administered intravenously during this period. Oxygen was administered continuously through a nasal tube. At the twelfth hour an ointment dressing of gauze was applied with the limbs in functional position. The first injection of ACTH was given 26 hours after the accident. Intravenous medication was discontinued, excepting 1 liter of 500 c.c. of electrolytes and 500 c.c. of plasma toward the end of the second day. Fluid by mouth was given up to 3 liters daily with hourly control of diuresis. The dosage of ACTH was 100 mgm. daily (25 mgm. every 6 hours) for 5 days, then 75 mgm. for 4 days, and finally 50 mgm. for 4 days, or a total of 1,100 mgm. of ACTH in 13 days. Other measures included a salt-free diet, 500 mgm. daily of ascorbic acid, vitamins A and B_1, methionamine, and a diet rich in proteins.

Penicillin was administered in moderate doses to prevent suppuration. Marked improvement was observed in the patient's clinical condition following the first day of ACTH therapy. On the third day he sat up and moved his limbs without difficulty. (Otherwise, at this stage complete collapse is usual.) By the end of the third day the stage of shock was over and was followed by a toxemic stage with slight anemia and moderate hypoproteinemia. The edemas subsided rapidly with progressive loss of weight. On the fifteenth day, the bandage was removed, and satisfactory epidermization of the superficial second degree burns was observed. Severe scars remained in the more severely burned areas. The administration of ACTH was then discontinued. By the twenty-fourth day all first and superficial second degree burns were completely covered with epidermis, and the other second degree and third degree burns showed marked improvement. Failure of an attempted graft in the right axillary region was attributed to insufficient immobilization in this region. The administration of 50 mgm. of ACTH daily for 8 days did not seem to improve the tolerance for grafts. However, at the end of the third month a slightly depressed cicatrization uniting the arm and axilla had formed with smooth, supple, and slightly keloid, but not fragile, skin, The only remaining unhealed area measured 7 by 10 cm. and was located in the interscapular region. Cicatrization in this region was delayed by a virus hepatitis. It is emphasized that at the age of 30 years, a 45 per cent destruction of the body surface entails a mortality of 50 per cent under the earlier forms of treatment. EDITH SCHANCHE MOORE.

An Evaluation of Pituitary Adrenocorticotropic Hormone (ACTH) in the Treatment of Severe Burns: Relationship to Skin Grafting. HAROLD M. TRUSLER, SANFORD GLANZ, and THOMAS B. BAUER. *Plastic & Reconstr. Surg.*, 1952, 9: 478.

The use of ACTH was studied in its relationship to three aspects of the treatment of severely burned patients: (1) the effect of ACTH on homograft survival in 2 patients, (2) the general therapeutic effects of the hormone in 11 severely burned patients, and (3) the effects of ACTH on experimental burns in rats and guinea pigs.

ACTH did not promote the permanent survival of homologous skin grafts in the 2 cases reported. In 1 patient homologous skin grafts survived for 14 weeks during ACTH therapy, but complete dissolution occurred within 3 days after the hormone was stopped. In the second patient, the homografts disintegrated at 8 weeks, while the patient was receiving a maximum dosage of ACTH.

The authors concluded that ACTH had general therapeutic value in the treatment of the 11 severely burned patients studied. The beneficial effects of the drug were: lowering of fever, increased appetite, improvement in nutrition, better psychological adjustment, decrease in the formation of granulation tissue, decrease in cicatrix deformities, and decrease in the frequency of transfusion reactions.

Experiments were performed on albino rats and guinea pigs to determine the effects of exogenous ACTH on the healing of burn wounds. Results were similar in both the rats and guinea pigs. Burns in the controls healed at approximately the same rate as those in animals receiving ACTH. A significant difference in weight changes was noted between the control groups and the groups given ACTH. The animals in the control groups lost considerable weight during the 30 day period, whereas the animals receiving ACTH gained weight consistently.

WILLIAM T. FITTS, JR., M.D.

Failure of an Antihistamine Drug to Influence the Course of Experimental Human Burns. S. SEVITT, J. P. BULL, C. N. D. CRUICKSHANK, D. MACG. JACKSON, and E. J. L. LOWBURY. *Brit. M. J.*, 1952, 2: 57.

The favorable effects of antihistamine drugs in the treatment of burns have been listed in the re-

cent literature: (1) relief of pain within a few hours of burning; (2) the prevention or reduction of blistering and edema; (3) the prevention or reduction of infection of the burns, and (4) increase in their rate of healing.

At the Birmingham Accident Hospital, Birmingham, England, 2 small partial thickness burns were inflicted on similar skin sites of each of 8 human volunteers. Each burning was carried out with a special burning iron at 60 degrees C., applied for 15 seconds. Four volunteers took antihistamine tablets immediately after the burns were inflicted, and continued with one tablet three times a day for 9 days. The other 4 subjects took dummy tablets according to the same schedule. The identity of the tablets was not known until the fourteenth day.

Observations during the first 48 hours were made on the clinical degree of edema and its onset and disappearance; on the area and distention of the blister and the histologic level of separation; on the concentration and nature of the blister fluid protein; on the nature of the cellular exudate; and on the time of onset of stagnation and stasis of the blood flow in the superficial dermis. Later, special attention was paid to the time of commencement, the rate and mode of development, vascularization, and epithelization of the burns.

Although some minor variations and differences in the burns were found, the similarities and differences within both the antihistamine and control groups were the same as the similarities and differences between the groups. It was, therefore, concluded that antihistamine tablets failed to influence the course of burns. CURTIS ARTZ, M.D.

Sudden Death Following an Injection of Penicillin. W. O. THOMSON. *Brit. M. J.* 1952, 2: 70.

Allergic reactions to penicillin occur in about 1.5 to 5.0 per cent of all patients treated with the drug. Death as a result of penicillin therapy is unusual and only a few cases have been reported. When a fatal reaction does occur it appears to be caused by (1) a Jarisch-Herxheimer reaction in known or unsuspected syphilitics; (2) severe allergic manifestations; or (3) anaphylactic shock producing death in a matter of minutes. Of the few reported deaths attributed to penicillin, only one (Waldbott, 1949) has been considered anaphylactic. The patient received 50,000 units of penicillin intramuscularly during an acute attack of asthma, reacted immediately with swelling of the mouth, generalized itching, and collapse, with extreme cyanosis and death. She had had penicillin previously without ill effects.

A complete case report of a 67 year old man who had received crystalline penicillin and procaine penicillin on several previous occasions without untoward effects is presented. The patient had no history of allergic manifestations until 6 weeks before his fatal episode, when he became unconscious and cyanotic after the injection of 300,000 units of procaine penicillin. Within a short time he recovered. Since he had experienced this severe episode it was believed that he should be given crystalline penicillin, and on the day of his fatal episode a bougie was passed for urethral stricture. Ten minutes after this procedure, the patient received 300,000 units of crystalline G in 3 ml. of sterile saline solution intramuscularly. Within a few minutes after the injection the patient began to feel nauseated and started to retch, producing a little vomitus. He became increasingly cyanotic with shallow respirations and entered into a state of collapse. He expired 10 minutes later in spite of the administration of adrenalin and nikethamide. Clinically, the impression was that this phenomenon was anaphylactic in nature. CURTIS ARTZ, M.D.

ANESTHESIA

Artificial Hibernation (Hibernation artificielle). P. HUGUENARD. *Anesthésie*, Par., 1952, 9: 240.

The term "anesthesia without anesthetics" has been replaced by the term "artificial hibernation." The method is based on stabilization of the autonomic nervous system supplemented by refrigeration. The latter is gradually replaced by reheating of the body and stimulation of the anabolism with return to normal conditions.

A choice of "lytic cocktails" which produce stabilization of the autonomic nervous system is at the disposal of the anesthetists: 4560 R.P., procaine amide, hexamethonium, pentamethonium, or pendiomide. The first mentioned product is ganglioplegic, anticholinergic, and sympatholytic; it causes slight hypotension and hypothermia and may be administered hypodermically, intramuscularly, or, preferably, intravenously.

The goal of controlled hypotension is autonomic blockade rather than limitation of bleeding.

Toward the end of the intervention, agents with a short curare effect are used as antagonists of the methonium salts. Barbiturates are prescribed only exceptionally for emotionally unstable patients.

Hypodermoclysis with the addition of hyaluronidase replaces venoclysis because rapid introduction of large amounts of fluids into the venous system in hibernating patients is dangerous.

Reheating is supplemented by anabolizing drugs such as androgens, corticoids, and neostigmine.

In 14 of 35 cases supplementary general anesthesia was required. Operations on the colon, rectum, sigmoid, stomach, diaphragm, and biliary system were performed under artificial hibernation.

Refrigeration is accomplished by means of ice bags placed on the precordium, abdomen, and the inguinal and axillary regions.

JOSEPH K. NARAT, M.D.

Certain Experimental Aspects of Artificial Hibernation (Quelques aspects expérimentaux de l'hibernation artificielle). H. LABORIT, C. JAULMES, and A. BÉNITTE. *Anesthésie*, Par., 1952, 9: 232.

An attempt was made to prevent hemorrhagic shock in dogs by hypothermia, combined with

stabilization of the antonomic nervous system by pharmacodynamic agents, especially so-called 4560 R.P., which is dimethylaminopropyl-N-chlorophenothiazime hydrochloride. This substance, which has a ganglioplegic, sympathicolytic, and parasympathicolytic effect, blocks the thermoregulation. It is injected intravenously before and during anesthesia.

The authors were unable to establish relations between the length of survival and the amount of blood lost. It seems that prolonged hypotension rather than the amount of blood lost per kilogram of body weight is responsible for the death of the animal.

Bradycardia and lowered oxygen consumption indicate that hibernating animals are in a stage of "lowered life" and react relatively slightly to aggressive external factors. Episodes of hemorrhage exert only a slight influence on the oxygen consumption by hibernating animals. Absence of anoxia and impairment of the capillary circulation resulting from hemorrhage are responsible for the absence of hemoconcentration. The survival period in the authors' experiments was in direct relation to the reduction of oxygen consumption.

Artificial hibernation not only reduces the metabolism but also preserves the blood volume by creating hypotension, limits vasomotor disorders, and diminishes capillary permeability either by acting upon precapillary sphincters or by inhibiting hyaluronidase.

A synergistic effect may be obtained by combining 4560 R.P. with phenergan, procaine amide, or barbiturates.

Manifest shock may be efficiently combated by combining the use of ganglioiplegic agents with blood transfusion. JOSEPH K. NARAT, M.D.

Controlled and Uncontrolled Hypotension. H. REINHOLD and C. COERS. *Acta Anaesthesiol. Belg.*, 1952, 3: 18.

The deliberate reduction of blood pressure during surgical operations has proved helpful to both the surgeon and patient in many cases. Frequently a reduction below clinically measurable levels has been followed by a satisfactory postoperative course. However, in a few instances such a favorable outcome did not ensue.

The case of a woman suffering from cancer of the uterus is reported in detail. With the exception of hypertension and obesity, her general condition was good. A total hysterectomy was done under combined general and spinal anesthesia, following 0.20 gm. of seconal on the night preceding operation and 9 mgm. of morphine plus 0.3 mgm. of scopolamine given 1 hour before operation. Orotracheal intubation was done under 0.50 gm. of pentothal and 9 mgm. of tubocurarine after spraying the larynx with pontocaine solution (1%). The face mask was then adjusted and the patient was given oxygen followed by 200 to 300 c.c. of cyclopropane per minute. A lumbar puncture was done and 2½ c.c. of 5 per cent procaine solution were injected followed by an intravenous drip of 5 per cent glucose. Twenty minutes after lumbar puncture the blood pressure was 80/50 and the pulse rate was 62. Five minutes later the pulse was 54 and the blood pressure was not demonstrable. Another 5 minutes later the blood pressure remained below measurable level and no pulse could be palpated at the temporal artery. This condition persisted for 10 minutes. At this time no pulsation could be felt in the abdominal aorta or in the heart when palpated through the diaphragm. Cardiac arrest with fatal issue was feared. Adrenalin (0.3 mgm.) was added to the intravenous drip, which was accelerated, and in less than a minute the pulsation of the abdominal aorta resumed.

Cyclopropane was then replaced by pure oxygen and slow controlled respiration was continued. By 9:40 spontaneous respiration returned with a satisfactory amplitude at 9:45. The inhalation mixture was changed to nitrous oxide-oxygen 25/75, and later 50/50 and 75/25. The patient was returned to the ward at 10:40 with good circulatory and respiratory function. An alarming neurologic postoperative syndrome developed, with loss of consciousness and convulsive fits. Since there was no sign of improvement, it was feared that the patient had suffered hopeless cerebral damage. Four days after operation a slight improvement was observed. This continued, although difficulties in speech, movement, and incontinence persisted. The condition gradually improved and examination 3 months after the operation revealed the patient in good condition, working in the village store, with only occasional headache and loss of memory. The patient had also become irritable and stingy. These findings suggested a possible local dysfunction of the left temporal parietal region as the organic sequelae of circulatory failure. Similar cases described in the literature are cited, including cases of extreme intellectual deterioration with partial aphasia and apraxia.

The minimum blood supply required to prevent cerebral damage is not known. In the present case the very pronounced hypotension was most probably an etiological factor. It is strongly urged that in cases in which hypotension may be considered beneficial for operation, the blood pressure should be kept at a controlled level and never be permitted to drop so low that definite signs of effective blood circulation cannot be demonstrated.

EDITH SCHANCHE MOORE.

Diminished Hemorrhage with Controlled Hypotension (La diminuzione dell'emorragia mediante la tecnica dell'ipotensione controllata—Osservazioni su 130 casi). ERNEST KERN and ROSANNA MENNUNI. *Gior. ital. chir.*, 1952, 8: 401.

The authors report on controlled hypotension after using it in 130 cases.

They use hexamethonium and pentamethonium. The usual dose is 50 mgm. for a patient weighing 70 kgm. The average drop in blood pressure was 60 mm. of mercury. In 10 cases the pressure dropped to

0 (in 8 cases for a few minutes and in 2 cases for 30 minutes). There was no important complication.

The results were quite satisfactory. By comparison, in 75 patients with herniated disc followed by spinal fusion with a graft from the iliac crest, operated on without hypotension, the average blood replacement was 750 c.c. In 28 patients operated upon with controlled hypotension, the average was only 150 c.c.

Of particular interest were 4 cases of bilateral arthroplasty of the hip. Each of these had controlled hypotension for operation on one side and regular anesthesia for operation on the other side. When controlled hypotension was used, only one patient required a transfusion of 100 c.c. When controlled hypotension was not used the average blood replacement was 1,250 c.c.

There were 12 complete failures and 11 partial failures. In 9 cases the blood pressure did not drop, while in 14 cases there was normal bleeding even though the blood pressure was low.

Controlled hypotension is considered to be a technique which has very interesting possibilities and merits a complete investigation. It must be remembered that it is a delicate method and its exploration must be carried on with prudence and only by expert anesthetists. LUCIAN J. FRONDUTI, M.D.

Pethidine in General Anesthesia. P. BOISSON. *Acta Anaesthesiol. Belg.*, 1952, 3: 7.

On the basis of 400 anesthesias with combined pethidine (intravenous) and nitrous oxide oxygen inhalation, an attempt is made to define the role of pethidine in general anesthesia.

Pethidine (dolantine, demerol, meperidine, dolosal) is a piperidine derivative which was synthesized in 1939 by Eisleb and Schaumann. It is endowed with powerful analgesic action, powerful antispasmodic action, but a less powerful atropinic and antihistaminic action. In clinical doses it is only slightly hypnotic and depressant to the circulation and respiration. It was first used to relieve pain and spasms. As an obstetric analgesic, when administered alone it was satisfactory in less than 40 per cent of the cases. It was then used as a supplement to nitrous oxide anesthesia, rendering the latter effective and flexible as well as preventing oxygen deficiency.

The author uses the following technique:

A mild barbiturate is given the night before operation and pantopon-atropine is given 1 to 1½ hours prior to operation. Small doses of pantopon with phenergan are now preferred. In the operating room, 50 mgm. of pethidine in a solution of 10 mgm. per cubic centimeter is injected intravenously in 30 to 60 seconds. In very young subjects or strong male patients 100 mgm. are occasionally given. Respiration slows down temporarily to 15 per minute, with a corrective increase in amplitude. The full pethidine effect is obtained in 5 to 10 minutes. Sleep is then induced with pentothal and closed circuit inhalation of N_2O 75/25 is induced with gentle positive pressure applied intermittently to the bag. After 2 to 3 minutes, nitrous oxide is reduced to 50 per cent, and positive pressure is discontinued. The patient then usually shows a good color and respiration but does not respond to painful stimuli. If necessary, intubation is performed and the incision can be made. Curare or curarizing drugs are injected as required. It is frequently possible during maintenance of the anesthesia to reduce the nitrous oxide concentration to 30 per cent. Additional doses of at most 25 mgm. of pethidine may be needed from time to time. The average dose for an operation requiring 1 to 1½ hours is 75 to 100 mgm. for an adult of 40 years. More than 225 mgm. for an operation requiring more than 3 hours has never been given. The pupils give no sign of the level of anesthesia. Accelerated respiration, and little movements of the hands and feet suggest the need for additional pethidine. If such signs are absent, continuous drip addition of pethidine is contraindicated in order to avoid overdosage and cumulation. The patient wakes shortly following removal of the mask, and for this reason it should not be removed until all painful stimuli have ceased. Most of the patients in the present series were females over 40 years of age, but good results have also been obtained in younger patients.

Induction is smooth and easy and the bronchodilating effect is a great advantage, with rapid stabilization of the anesthesia. Intubation is easy and it is usually possible to remove an endotracheal tube without aspirating any appreciable amount of mucus. During the course of anesthesia, the pulse rises slightly, stabilizing at about 100.

In cases of severe, prolonged hemorrhage, pethidine should be discontinued with resort to light doses of ether. Consciousness returns in a few minutes and all except 4 patients were awake within 30 minutes. A secondary light sleep is common. This early awakening and postoperative analgesia are probably responsible for the low incidence of respiratory complications in this series. Nausea and vomiting occur as with other forms of anesthesia.

Pethidine anesthesia can be accurately controlled and provides low toxicity and good oxygenation. There is no marked depression of the vital functions and the postoperative analgesia persists longer than with any other method. However, great care and constant control are imperative because vital medullary centers may be affected.

EDITH SCHANCHE MOORE.

A Defense of Spinal Anesthesia. FRANK COLE. *Anesthesiology*, 1952, 13: 407.

The author takes strong exception to a recent editorial stating that "spinal anesthesia is dangerous." Several paragraphs are devoted to an analysis and refutation of the mortality figures given in the editorial in question. The author also examines the published statistics of other authors concerning the risk of spinal anesthesia. He quotes Trent and Gaster who, discussing anesthetic deaths in over

54,000 cases, reported that all deaths that occurred during spinal anesthesia in their series were in patients judged to be poor operative risks who were undergoing emergency abdominal operations. Their mortality rate following spinal anesthesia was 0.11 per cent, which the author states is a favorable comparison to the mortality rate for all anesthesias of 0.12 per cent reported by Gillespie. The author quotes numerous other articles concerned with the advantages of spinal anesthesia. In over 10,000 spinal anesthesias at the Mayo Clinic, no instance of permanent motor paralysis had been encountered.

The author states that a considerable amount of confusion results from the vagueness of the term "anesthetic death." He believes that anesthetic deaths may be divided into four groups: (1) those occurring on the operating table; (2) patients who die after being returned to their rooms but who have obviously never recovered from the effects of anesthesia; (3) deaths occurring during the first few days following anesthesia in surgery; and (4) all cases in which the patient does not leave the hospital alive.

The author makes a plea for a better understanding of what is meant by authors when they speak of mortality rates and emphasizes that each series of statistics presented by different workers can be compared only within identical groups. He believes that undue emphasis is placed upon death occurring in the patient under spinal anesthesia, whereas death under inhalation anesthesia attracts much less attention. The author believes that most of the studies on mortality due to spinal anesthesia were made between 1930 and 1943 and that spinal anesthesia has greatly improved since that time. The author condemns the attitude of administering a spinal anesthetic and leaving the patient without either a nurse or doctor in attendance. He believes that the unattended patient who has spinal anesthesia is unsafe, but to discard spinal anesthesia because of this is unwarranted. He emphasizes that it requires only to be administered by trained physician anesthetists, and it is entirely safe so long as it is considered to be a major medical procedure, while, like any other form of anesthesia it can be made dangerous by performing it recklessly and inviting disaster. He believes that undue carelessness and a casual attitude are responsible for a majority of catastrophes with spinal anesthesia. The mortality rate of general anesthesia has changed little if at all since the popularization of spinal anesthesia, while the mortality rate of spinal anesthesia has steadily decreased.

ALLAN D. CALLOW, M.D.

The Development of Efocaine; a New Approach to Prolonged Local Anesthesia. F. P. ANSBRO, A. H. IASON, H. E. SHAFTEL, A. HALPERN, and Others. *Anesthesiology*, 1952, 13: 306.

Efocaine, a new local anesthetic, has been investitaged by the authors. They found it provides a prolonged effect in controlling postoperative pain. It consists of time-tested local anesthetic agents in a clear, nonoily solvent which is miscible with tissue fluids. Its anesthetic base is only slightly soluble in water but it is completely soluble in the organic solvent of efocaine. This solution of anesthetic agents exists at a critical saturation level so that contact with the tissue fluid causes complete and immediate deposition of the anesthetic at the site of injection. Thus, upon injection of the clear water miscible efocaine solution, an in situ depot of procaine is formed for prolonged local anesthesia. The solvents are excreted within 24 hours. The crystalline anesthetic depot slowly liberates and continues to produce prolonged action at the site of injection.

Histopathological study of the tissue which received an injection of efocaine was made in experimental animals. There was no demonstrable change in the tissue of the animals which were followed up for a long period of time.

Clinical study of the drug in more than 75 patients was evaluated as a means of controlling postoperative pain. It was concluded that efocaine was highly effective in the control of postoperative pain. A single injection of efocaine produced continuous relief of pain averaging 8 days. There was no local or systemic toxic reaction; tissue slough or gross necrosis was not encountered.

Efocaine appears to be admirably suited to the needs of physicians for the control of pain, and in cases in which prolonged anesthesia is indicated. Further work is now in progress in order to develop its full scope in the practice of medicine.

C. YEIN, M.D.

Anesthesia Potentialized by Neurosympathetic Inhibition (L'anesthésie potentialisée par inhibition neuro-végétative). A. GOLDBLAT, C. CHEVALIER, and S. LEROY. *Acta anaesthesiol. belg.*, 1952, 3: 27.

The authors report their experiences in a series of 267 cases of anesthesia potentialized by controlled inhibition of the neurosympathetic system. The technique is described as follows:

Following the oral administration of barbiturates the evening prior to operation, adults are given 0.02 gm. of pantopon, ½ mgm. of atropine sulfate, and 1 ampoule of phenergan (50 mgm.) by intramuscular injection 1 hour before the intervention. Aged, emaciated, or toxic patients are given 0.01 gm. of pantopon, ½ mgm. of atropine and ½ ampoule of phenergan. If the operation is to be performed on the digestive tract, a Ryle tube is inserted.

During the first stage of induction, two flasks are prepared, one containing 500 c.c. of physiologic serum with 0.5 gm. of procaine and a smaller one containing about 190 gm. of serum containing 1 ampoule (100 mgm.) of dolosal and 1 ampoule of diparcol (250 mgm.). The two flasks are connected by a Y with a three-way cock to the vein. At first the tube from the dolosal flask is clamped and several cubic centimeters of the procaine solution are permitted to flow in, in order to determine the tolerance. Only 1 case of intolerance was discovered among 267 patients. Immediately thereafter the

clamp is changed and the contents of the small flask are infused at a rate of 80 to 120 drops per minute (usually ½ flask for weak patients and a whole flask for stronger patients). The duration of the induction averaged 21.5 minutes in the 267 cases, with extremes of 7 to 55 minutes. Respiratory or circulatory depression during this first phase occurred in only 2 cases of the series.

In the second stage, after the correct dose of dolosal-diparcol solution has been infused, the patient is usually drowsy but can answer questions. The facial color is normal, the voice barely audible, and the eyes are closed. Respiration is calm and the deep pulse is regular. The clamp is then changed to permit the procaine solution to run through for about 1 minute to rinse the tube (pentothal must not be injected prior to this precaution or a precipitate will form and obstruct the needle). Curare and pentothal are then injected through the three-way cock in small doses (9 to 12 mgm. of curare and from 0.10 to 0.15 gm. of pentothal will usually permit intubation). The closed circuit anesthesia apparatus is connected and a mixture of 30 per cent of nitrogen monoxide plus 70 of oxygen is administered.

Maintenance is effected with carefully fractioned doses of 3 to 6 mgm. of curare (total 15 to 18 mgm.) and of 0.10 to 0.15 gm. of pentothal (total 0.20 to 0.30 gm.) before incision of the skin. After about 15 minutes, the anesthesia becomes stabilized and only spaced doses of 3 mgm. of curare or 0.05 gm. of pentothal are required according to the individual reaction. The total doses of these two drugs rarely exceed 0.30 to 0.50 gm. of the first and 18 to 24 mgm. of the second for operations lasting 90 to 120 minutes. The total dose of procaine administered rarely exceeds 0.50 gm. per hour. Its effect is inconstant, but if the administration is interrupted, cyclopropane or pentothal must be administered after 5 minutes. The detailed results in this series have been discussed elsewhere. It suffices to emphasize the ease of induction, the superficial narcosis which can be brought to the correct level by the injection of 0.05 gm. of pentothal or a whiff of cyclopropane, and the absence of shock. The vicious circle appears to be considerably retarded and capillary hyperpermeability is abolished. There appears to be an increased resistance to reflex or neurogenic shock as well as to hemorrhagic shock. Most patients are completely roused in 1 to 3 hours following termination of the narcosis; they are then in a calm state and very rarely complain of severe pain. Even in the absence of the latter a sedative is administered; 0.01 gm. of pantopon plus 25 mgm. of phenergan given by intramuscular injection usually suffice to keep the patient comfortable for the first 12 hours when the dose may be repeated if necessary. Amnesia is common, extending back to the time of infusion. Vomiting on awakening is unusual and can easily be avoided by the insertion of a Ryle tube prior to operation. Euphoria, indolence, and somnolence usually disappear after 24 to 36 hours. Urinary retention occurred in only 28 cases and oliguria in 33 cases; intestinal peristalsis was easily re-established.

Complications included 28 cases of tracheitis, 14 with symptoms of atelectasis, and 8 cases of venous thrombosis. There were 8 deaths, 6 of which were late and independent of the anesthetic. One patient died during attempted intubation. This was an obese subject with goiter who had been admitted in a condition of deep cyanosis. Direct cardiac massage was tried but failed to save the patient.

Another patient died some hours after the operation. This was an aged subject suffering from diabetic gangrene who was treated by amputation and lumbar sympathectomy. The patient died following sudden cyanosis and collapse.

It is difficult to tell whether the good results are due to the absence of intoxication or to the inhibition of the neurosympathetic system, but a study of the present series seems to confirm the role of the latter, especially in operations on hyperthyroid subjects. This technique is considered the method of choice for weak subjects and for extensive operations. EDITH SCHANCHE MOORE.

SURGICAL INSTRUMENTS AND APPARATUS

Use of Silicone Oils in Maintaining Surgical Instruments. FRANK W. CROWE. *J. Am. M. Ass.*, 1952, 149: 1464.

Results of a 3 month study on the use of silicone oils for the maintenance of operating room instruments at the University of Michigan, Ann Arbor, are reported. The silicone oil agent (surgicote-R) was found to be an excellent lubricant and water repellent while being inert chemically and physiologically. These organic compounds which have a quartzlike skeleton consisting of alternating silicone and oxygen atoms are found to be nontoxic.

Physical properties of the 500 centistoke DC200 fluid include a freezing point of −50°C., a boiling point of 200°C., and viscosity temperature coefficients in a range from 0.60 to 0.625 showing little viscosity change with temperature elevation. The volatility is 2 per cent after 48 hours at 200°C.

The time involved in the care of instruments was greatly reduced and the efficiency of the instruments appreciably increased by first cleaning the instruments in a rust-removing solution, drying them, and then applying a thin coat of the silicone oil with an applicator stick. W. FOSTER MONTGOMERY, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Glomus Jugularis Tumor of the Middle Ear. RICHARD N. LAND. *Radiology*, 1952, 59: 70.

Guild, in 1942, proposed the name of "glomus jugulare" for the designation of a carotid body-like tumor, usually found in the adventitia of the dome of the jugular bulb, immediately below the bony floor of the middle ear and near the ramus tympanicus of the glossopharyngeal nerve. Rosenwasser, in 1945, reported a case in which the tumor extended from the middle ear into the mastoid process. He described the roentgenographic findings as revealing marked clouding of the periantral region and decalcification of the septum in the perisinuous region on the affected side. There was no destruction of the mastoid process or petrous bone in his case.

A perusal of the literature shows that several similar cases have been reported since then, and that 11 cases were discovered and reviewed at Memorial Hospital alone in 1948.

In the present article the author described in detail an additional case by placing emphasis on the roentgen findings, and on the differential diagnosis from other bone-destroying lesions of the middle ear.

The case is that of a 42 year old colored woman who, after having had pain in the left ear associated with increasing difficulty of speech for 4 years, consulted a physician in November, 1947. Examination at that time revealed a hard protrusion from the external canal of the left ear, which bled easily on manipulation. Two years later an operation was performed for cholesteatoma; this was followed by complete loss of hearing on the left side. When first examined by the author in March, 1951, the patient complained of severe left frontal headaches associated with vomiting. There was no history of convulsions, but 3 weeks prior to her examination she developed sudden paralysis of the left face. Later she was hospitalized, and after thorough clinical and roentgenological study she was subjected to posterior fossa craniotomy. A tumor of the left mastoid bone was encountered which could not be completely removed. Postoperative roentgen therapy with an estimated tumor dose of 4,600 roentgens, administered in 6 weeks, resulted in definite improvement. The histopathological report was glomus jugulare tumor.

The roentgen findings were of considerable interest. In the Stenvers' position there was widespread destruction of cells in the mastoid process with extension into the mastoid antrum. In the Towne's position there was destruction of cells in the mastoid antrum beneath the posterior aspect of the tegmen; disorganization of cells in the petrous apex; destruction of the outline of the tympanic cavity anterior and inferior to the antrum; and poor definition of the superior and inferior walls of the external auditory canal. The very irregular destructive process suggested the presence of a new growth rather than changes due to an inflammatory lesion.

The differential diagnosis includes: cholesteatoma, which is a common complication of otitis media, and owing to its slow growth produces sharply marginated areas of rarefaction in a usually sclerotic mastoid; surgical defects; benign tumors; fibrous dysplasia; and other malignant tumors. The greatest difficulty is, as a rule, encountered in this latter group since malignant tumors can duplicate the picture of a glomus jugulare tumor, making accurate differentiation impossible. T. LEUCUTIA, M.D.

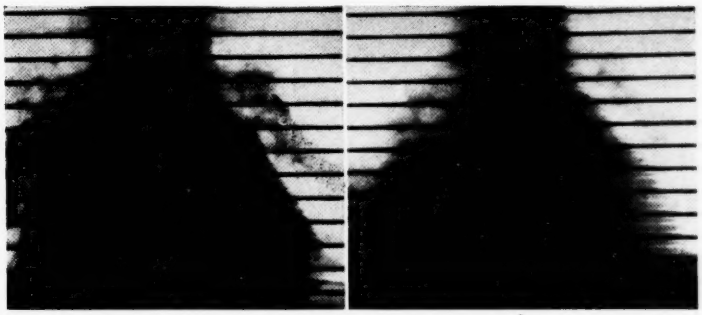
Roentgenography of Fibroadenoma of the Breast. J. GERSHON-COHEN and HELEN INGLEBY. *Radiology*, 1952, 59: 77.

After a brief review of the pathogenesis of fibroadenoma and its relationship to the hormones of the sexual cycle, the authors discuss the value of the roentgenographic examination in the diagnosis of this tumor and its differentiation from cystic and other neoplastic lesions of the breast. Numerous roentgenographic reproductions are used for illustration of the pertinent points.

It is stated that the examination must include roentgenograms made in a lateral and tangential view of each breast. A small lead shot is placed on the skin over the tumor area for localization. The observation of a meticulous technique is important.

Since fibroadenoma has the same density as normal breast tissue, its presence can be discerned on the roentgenogram only under certain conditions. The authors distinguish the following three degrees of discernment: (1) no visibility in the compact adolescent mazoplastic or pregnant breast; (2) partial visibility where the tumor projects into the subcutaneous layer of fat or where there is sufficient fat invasion to serve for contrast purposes; and (3) complete visibility because of large tumor size or a high fat content of the breast.

The differential diagnosis includes (a) cysts, (b) papilloma, (c) secretory cystic disease with plasma-cell mastitis and (d) carcinoma. The criteria which may prove helpful in the differentiation are given ample consideration, emphasis being laid on the fact that familiarity with the appearance of the normal breast and with that of mazoplasia is required when using these criteria. In mazoplasia I, for example, the breast is compact and has a uniform density, whereas in mazoplasia II, characterized by cyst formation, the breast is not uniform in density. Papilloma may be suspected when an elongated tortuous subareolar duct is visualized, or in case of intracystic location when the density of the cyst suggests the presence of hemosiderin. In plasma-cell mastitis the flamelike stromal digitations streaming backward from the areolar area and the coarsely



a b

Figs. 1a and 1b (Haubrich). Calcified pericardium ("Panzerherz") before and after operation. Marked increase of amplitude on both borderlines of the heart, in spite of a larger transverse diameter.

tentacled mass are of diagnostic significance, but a confusion with mazoplasia II or carcinoma cannot always be avoided. In carcinoma the spiculated or tentacled margins of the tumor, as contrasted with the smooth border of fibroadenoma, and the secondary signs of malignancy such as dimpling and retraction or edema of the skin, are of interest.

In summary, the authors state (1) that fibroadenomas are more apt to occur in adolescents or young adults, at which age the breasts usually are mazoplastic, compact, dense, and smoothly contoured; (2) that a palpable tumor in an adolescent or young adult not visualized roentgenographically is probably a fibroadenoma; (3) that a fibroadenoma more likely resembles a cyst than carcinoma or any other disease of the breast; (4) that the calcification sometimes seen in fibroadenoma tends to assume bizarre forms and is not readily confused with the scattered, fine punctate deposits occasionally found in scirrhous carcinoma; and (5) that fibroadenomas often occur in both breasts, although symptoms may be localized to one side. T. LEUCUTIA, M.D.

Roentgen Kymographic Study of Hearts after Operation for Concretio Cordis (Roentgenkymographische studie an operierten Panzerherzen). R. HAUBRICH. *Acta radiologica*, 1952, 37: 543.

The author, director of the X-ray Department at the University of Bonn, Germany, discusses in this article the x-ray kymograms of patients in whom pericardiectomy had been performed for calcifying pericarditis. By comparing the kymograms before and after the operation the degree of improvement of heart function can be assessed. Increase of width and return to normal of the heart movements indicate correction of the function. Difficulties of interpretation may be caused by a possible shift of the boundaries of the involved portions after cardiolysis.

The amount and the localization of calcification vary greatly in the individual cases. Besides calcium deposits in spots and in ring shapes, the entire pericardium may be transformed into a hard shell surrounding the heart like an armor (Panzerherz). Also, isolated cup-shaped calcifications may occur.

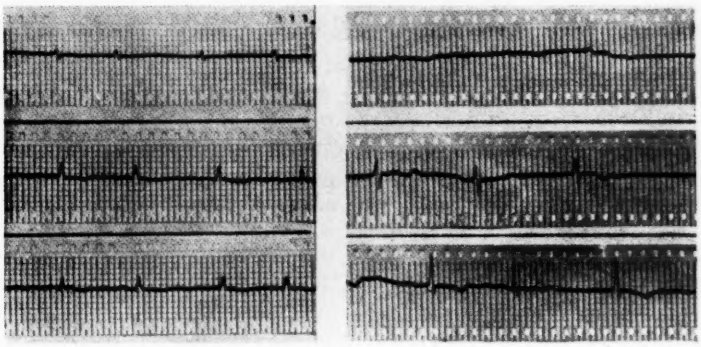


Fig. 1c. Electrocardiogram of the same case: after the operation there was an increase of the electrical potential from 0.4 to 1.1 millivolts.

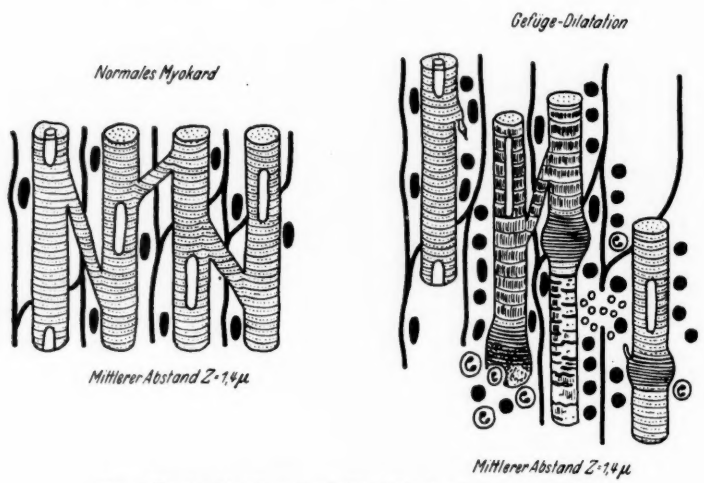


Fig. 1 (Linzbach). Structural dilatation in severe myocarditis.

These different localizations, especially at the base and the apex, can be demonstrated by kymograms in atypical directions.

Many instructive pictures are shown in the article which should be read in the original.

WERNER M. SOLMITZ, M.D.

Pathologic Anatomy of Changes in Shape and Size of the Human Heart Which are Demonstrable by Roentgenography (Die pathologische Anatomie der roentgenologisch feststellbaren Form—und Groessenveraenderungen des menschlichen Herzens). A. J. LINZBACH. *Fortsch. Roentgenstrahl.*, 1952, 77: 1.

The author discusses the gross and histologic changes of the myocardium in different forms of dilatation and hypertrophy and their relation to the roentgenologic findings.

The normal adult heart has a weight of 300 gm. and a volume of 1,000 c.c. The number of muscle fibers is the same for the left as for the right heart. The distance between two Z membranes within the fiber is always the same, namely, 1.3 to 1.4 micra, regardless of the age of the individual or the weight of the heart. The same rule applies to the skeletal striated muscles.

By physical exercise and in athletes the weight of the heart may increase. This increase, up to the "crucial weight" of 500 gm., is caused only by lengthening and thickening of the individual fibers; no new fibers or capillaries are formed. As the nuclei grow at a much slower rate than the cytoplasm the proportion between the nucleus and the cytoplasm is changed in these hearts. When the hypertrophy surpasses the "crucial weight" the fibers and their nuclei split longitudinally, and new capillaries are formed. Above the "crucial weight" the large coronary vessels do not grow accordingly, and so a chronic insufficiency of blood supply ensues. Consequently, larger and smaller areas of myocardium become necrotic, and scars develop in the heart muscle. At the same time, the closely woven fabric of muscle fibers is loosened, and the interspaces between the individual fibers are widened. The author calls this condition "structural dilatation."

The relation between the described pathological changes and the roentgenological findings is mentioned only very briefly. As the right atrium forms the border of the usual x-ray silhouette, a minor and transitory widening of the atrium may simulate marked dilatation and give rise to erroneous interpretation.

WERNER M. SOLMITZ, M.D.

The Roentgenoclinical Method of Gutmann in the Early Diagnosis of Cancer of the Stomach (Il metodo radio-clinico di Gutmann nella diagnosi precoce del cancro gastrico). GIOVANNI SANQUIRICO and NICOLO MINUTO. *Radiol. med.*, Milano, 1952, 38: 497.

At the Civil Hospital, S. Martino, in Genoa, Italy, they have been attempting to introduce the method of Gutmann for the early diagnosis of gastric cancer. The studies have been made in collaboration with the Radiologic Institute of the University of Genoa. Up to the present they have been able to detect with the method 3 instances of gastric cancer, or a precancerous state, and have successfully operated on 2 patients.

The first patient, a 60 year old man, had suffered with fairly typical ulcer symptoms for 10 years. For about 6 months past there had appeared loss of appetite, repugnance for meat, and loss of weight. Roentgenologic examination disclosed an ulcer niche at the angle of the lesser

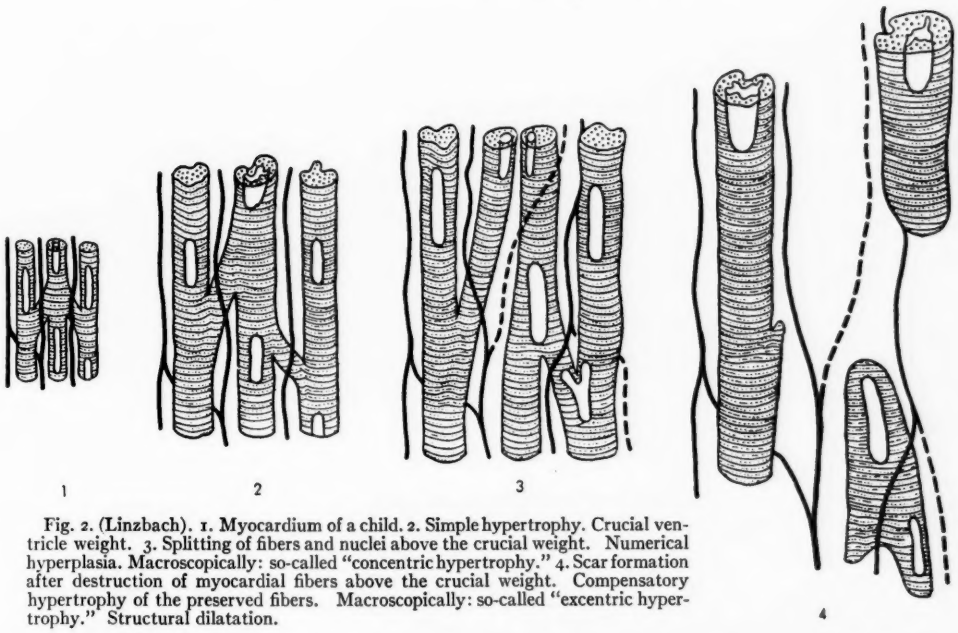


Fig. 2. (Linzbach). 1. Myocardium of a child. 2. Simple hypertrophy. Crucial ventricle weight. 3. Splitting of fibers and nuclei above the crucial weight. Numerical hyperplasia. Macroscopically: so-called "concentric hypertrophy." 4. Scar formation after destruction of myocardial fibers above the crucial weight. Compensatory hypertrophy of the preserved fibers. Macroscopically: so-called "excentric hypertrophy." Structural dilatation.

gastric curvature; the angle itself was blunted, rigid, and beneath the image of the niche was a rather typical meniscus, that is, shadow-defects suggesting infiltration and edema of the contiguous mucosa. Following 2 months of ulcer treatment, the appetite returned and the patient gained 6 pounds in weight; however, the roentgenological manifestations were accentuated rather than lessened. At operation a suspicious looking ulceration of 3 cm. diameter was uncovered at the suspected point, and histological examination disclosed a superficial cancerization of the mucosa contiguous to the ulceration. Now, after 2 years, the patient is perfectly well.

The second case reported was that of a 55 year old woman who had suffered for about 4 months of dyspeptic symptoms and loss of weight. Roentgenologic examination disclosed a prepyloric ulcer of the lesser curvature with surrounding infiltration, which suggested a neoplastic origin. Since the roentgenologic manifestations under treatment during the subsequent month did not improve the patient was operated upon. The surgeon, however, did not find anything wrong and closed the abdomen without resection.

A year later vomiting appeared and roentgenologic examination at this time disclosed retarded evacuation. Resection disclosed a return of ulcer trouble at this place but carcinoma could not be demonstrated. Another year passed with the patient in fairly good health, then vomiting reappeared and reoperation disclosed neoplastic infiltration of the anastomosis, accompanied by lymphatic dissemination. Anterior gastroenteroanastomosis was carried out and death occurred one month later.

The third patient, a 48 year old woman, was examined roentgenologically and her condition was tentatively diagnosed as an irritated appendix. Dietary therapy brought no relief. Two years later vomiting started, and 2 years after that (6 years in all) the roentgenologic examination disclosed what appeared to be a stenosed section of antrum, which persisted under the morphine test. Under 1 month of ulcer therapy the condition did not appreciably change.

Resection was done and the specimen disclosed an evident cancerization of an extensive precancerous process of the antrum, where the muscle layers were found thickened, the mucosa rigid and without plicae, with thickened epithelial coat, in places with tiny ulcerations; and in other places there were mucinous adenomatous hyperplasias, evidently of neoplastic character.

Encouraged by these results the author hopes to gain much by a close study of the method of Gutmann. Here, however, he does not agree with the views of Gutmann's school, which regards the course of every gastric cancer to consist of two phases: the first phase consisting of a more or less lengthy period when the cancer is confined to the mucosa, and the second phase consisting of an explosive reassumption of activity of the neoplastic

process with rapid extension and growth in depth. Here the author tends rather to lean on the dualistic theory of Lambling who, in addition to the process as postulated by Gutmann's school of thought, also postulates a form of gastric cancer of more or less continuous growth and spread, right from the very start.

Thus the author even questions the advisability of delaying operation in the instances in which cancer is suspected, but in which, even if the lesion is not cancer, it is certainly irreversible. Thus the author thinks that the therapeutic test should not continue for the period of 3 months, as permitted by Gutmann, but should be terminated after, at most, 2 weeks. Here (as an instance of the possibility of harm from delay) the case is cited of a 36 year old physician who was operated upon 6 days after the first symptoms appeared and yet the condition was found to have already invaded the deeper layers of the gastric wall and even to have invaded the adjacent lymphatic system.

JOHN W. BRENNAN, M.D.

A Roentgen Study of the Effect of Total Pancreatectomy on the Stomach and Small Intestine of the Dog. JOHN F. WEIGEN, EUGENE P. PENDERGRASS, ISADORE S. RAVDIN, and THOMAS E. MACHELLA. *Radiology*, 1952, 59: 92.

The roentgen appearance of the small intestine and its motility have been shown to be affected by numerous intrinsic and extrinsic factors. Although the small bowel is sensitive to this multitude of stimuli it reacts in a limited manner. For this reason the findings of an altered motor pattern can rarely be attributed to a definite entity. Limitations of the small intestinal roentgen examination will continue until the stimuli and the motor changes they produce are more fully understood. Among the factors requiring further study are the internal and external secretions of the pancreas.

In an effort to study the effect of loss of pancreatic secretions, roentgen examinations of the gastrointestinal tract of dogs, before and after pancreatectomy, were performed with an inert barium meal. As the dogs were total diabetics postoperatively and it was not possible to maintain the blood sugar levels within normal range, the examinations were performed during sustained periods of hyperglycemia and of hypoglycemia.

The study showed that hyperglycemia in the depancreatized dogs was associated with delayed gastric emptying and with prolonged small intestinal transit times. Hypoglycemia in the depancreatized dogs was associated with normal, and at times rapid, gastric emptying and small intestinal transit. The absence of external secretions of the pancreas from the intestine did not appear to alter the tone of continuity of the small intestinal pattern nor the tone of the proximal colon. The loss of pancreatic function was not shown to alter gastrointestinal motility while the blood sugar was low, and the effect, if any, of loss of pancreatic function could not be evaluated in examinations performed while the blood sugar was elevated because of the marked effect upon gastrointestinal motility associated with hyperglycemia. For this reason, a comparison study of dogs before and after ligation of the pancreatic ducts is to follow.

JOHN F. WEIGEN, M.D.

Abdominal Aortography in Renal Diseases. ROLF WEYDE. *Brit. J. Radiol.*, 1952, 25: 353.

The author reports his findings in 210 aortographies among a total of 200 patients seen at the Ullevaal Hospital, in Oslo. Seventy per cent nycotrast (*syn.* diodrast) was used as the contrast medium. A simple technique was used under local anesthesia and a hand syringe was employed for the injection. The chief contraindications for the examination were considered to be impaired function of the kidney and liver and hypersensitivity to the contrast medium.

In renal disease considerable information is obtained by aortography. The angiographic findings in solitary cyst, polycystic kidney, malignant tumors, hydronephrosis, and kidney tuberculosis are described.

In the angiogram the solitary cyst is seen as a dark, rounded avascular area of decreased density, which is encircled by displaced, but otherwise normal, kidney vessels. A few seconds later the cyst stands out as a dark, rounded, sharply outlined area in the contrast-laden kidney. Large cysts near the hilum are most easily demonstrated, but smaller cysts in the periphery and multiple cysts, as in a polycystic kidney, can also be clearly demonstrated.

In malignant tumors of the kidney parenchyma the roentgenograph in the arterial phase of the circulation shows a meshwork of pathological, newly formed vessels of varying size, form, number, and distribution within the contour of the kidney. The preformed vessels may be displaced and have a circular course around the tumor. They can be differentiated from the tumor vessels. A few seconds later the contrast may be seen to accumulate in the tumor, and thus demarcate it sharply from the normal part of the kidney. Later the tumor area is dark without contrast while the normal part of the kidney may show increased density during excretion of the contrast.

In hydronephrosis the characteristic findings were atrophy of the arteries paralleling the atrophy of the renal parenchyma. At the same time, possible abnormalities in the number, course, and branching of the renal vessels may be demonstrated. During the venous phase the circulation of the renal vein may be seen running in a bow-shaped arch at the base of the renal pelvis. The renal pelvis is usually visualized even in cases with a minimal amount of normal parenchyma.

As far as inflammatory lesions of the kidney are concerned, it is not possible to differentiate between specific and nonspecific inflammatory destruction of the renal parenchyma. In both instances, however, it is possible to outline the extent of the de-

struction. A tuberculous process produces changes in the arterial pattern and in the internal renal architecture seen in the nephrogram. The destroyed parts of the renal parenchyma show decreased vascularity. The vessels are atrophic and more irregularly outlined, with uneven contours, varying caliber, and often showing abrupt terminations. Some vessels are stretched, while others are displaced and run in a bow-shaped course around the focus. Such changes indicate the extent of the focus, the vascular pattern being different from that in normal parts of the kidney. Further, the destruction causes loss of the normal internal structure of the kidney and loss of function, manifested in the nephrogram by more or less circumscribed dark areas within the contrast-laden kidney.

The author believes that aortography is a safe and relatively simple procedure which has improved the diagnosis in the diseases discussed.

FRANK L. HUSSEY, M.D.

New Types of Lesions of the Wrist (Lésions nouvelles du poignet). JEAN PIERRE BUGNION. *Acta radiol.*, Stockh., 1951, Supp. 90.

This is a radiologic and pathologic study of 600 wrists examined at the Geneva Institute of Pathology in Switzerland. More than half of the wrists had cystic lesions presenting lacunarlike images or defects on roentgenography. While sex and profession had no relations to the incidence of these lesions, frequency did increase with age, reaching a maximum between the ages of 61 and 70 years. The capitate and lunate bones of the wrist are the ones most frequently affected.

When histologic examination of the 18 most interesting wrists was accomplished, roentgenograms showed lesions of several types, as follows:

1. At a point where the ligaments fixing the carpal bones insert and the nutrient blood vessel penetrates the bone, there was noted a cystic lesion no larger than 2 to 3 mm. This was the lesion found most often in younger subjects. Pathologically there is a herniation of the synovial sac into these areas, depressing the cortex and contributing to the cystic development. Excellent photomicrographs show this finding in various stages of development. In several cases the authors found this development to be present in both the left and right wrists.

2. Due presumably to vascular disturbances, and seen most often in the aged, there was a development which the author calls "necrobiotic pseudocysts." These attain the dimensions of 8 to 10 mm. They are noted to be multiple within the same carpal bone and are due to a variety of specific causes. One case is presented in which the cyst was secondary to a small aneurysm; in another, it was adjacent to a thrombosed vessel; and in several other cases the cystic formations proved to be areas of fibrous tissue or homogenous bone replacement giving the effect of cystic development when seen roentgenologically. Some of these cysts reached the size of 0.25 to 2 mm. in diameter.

3. The third type of cystic development which the author noted was limited to the oldest age group and called a "marginal arthrotic" type of lesion. This concept has been previously described as "osteochondrose laminaire marginale." These cysts are constantly found in association with the chronic degenerative arthritic changes including thickening of the synovial membranes, areas of rarefaction of the cartilage, pannus formation, and evidence of inflammation as seen histologically.

Anatomically, the greatest number of cysts are seen in the semilunar carpal bone. This is thought to be due to the vagaries of the vascular supply to this bone, so that there is a predisposition to necrobiotic cyst development. The 112 page study is supplemented by 46 illustrations, all taken to show the roentgen and histologic features of the cysts.

JANE C. MACMILLAN, M.D.

Solitary Plasmocytoma with Terminal Dissemination. Three Cases in the Lumbar Spine. ENA B. DALGAARD and JORGEN B. DALGAARD. *Acta radiol.*, 1952. 37: 231.

The authors report 3 cases of plasmocytoma which first appeared to be localized to solitary areas in the bodies of the lumbar spine but later spread to other bones and organs of the body.

The case histories are given in considerable detail, including the autopsy findings. Photomicrographs of the biopsy specimens and reproductions of the electrophoretic patterns are used for illustration.

The site of the primary lesion in the 3 cases was in the bodies of the second, fifth, and third lumbar vertebrae, respectively. In all 3 cases the first symptom was recurrent pain in the lumbar region, radiating toward the legs. The first case was treated with immobilization for 4 years in the mistaken belief that the condition represented tuberculous spondylitis until a correct diagnosis of plasmocytoma was made by biopsy during an osteoplastic operation. The second case was referred with the diagnosis of neuralgic pain caused by pressure of a tumor of the cauda equina, and the third, with the diagnosis of sciatica. In the 2 latter cases the correct diagnosis was likewise established only after microscopic study of the biopsy specimens which were obtained by aspiration puncture of the vertebral bodies suspected of involvement. Preliminary roentgenograms of the spine were suggestive of a tumor.

Roentgen therapy produced some local relief and improvement in general health, but signs of dissemination appeared in the first case in 2 years, in the second case in 2.5 years, and in the third case in 3 months after the histologic diagnosis was made. Dissemination of the disease is usually disclosed by the presence of myeloma cells in the sternal marrow, roentgenologic demonstration of areas of rarefaction in various bones, increase in the serum globulin (detectable chemically or electrophoretically), a positive Bence-Jones reaction, and progressive aggravation of the general condition.

In concluding, the authors state that the findings support the view that myelomatosis often starts as a solitary plasmocytoma and metastasizes through the bone marrow system. T. LEUCUTIA, M.D.

Rotatory Irradiation. HOWARD NIELSEN. *Acta radiol.*, 1952, 37: 318.

Rotational roentgen therapy was introduced at the Radium Center of Aarhus, Denmark, in August, 1941. While most of the previous advocates of this method based their dosage on isodose charts made from measurements in cylindrical phantoms, the author tried to obtain data which would correspond more exactly to situations encountered in the human body. Therefore, during the years that followed he performed a large number of experiments with direct dose measurements in paraffin phantoms which were varied in shape (circumference) and structure (partly homogeneous, partly with embedded air cavities and bones). The results of these experiments were published in 1948 in the form of a monograph (Nielsen, Howard. *Rotation Irradiation. A Method of Roentgen Irradiation, Illustrated by Dosage Measurements in Phantoms*, Copenhagen: Ejnar Munksgaard, 1948). The work contained 125 isodose charts expressing the dose distribution in all regions of the body under varying conditions of irradiation for rotation angles of from 90 to 360 degrees, with change of the axis field, centering, and of quality of the roentgen rays. In addition, the measuring technique with Sievert's condenser chamber, the values of the absolute and integral doses, and various dosage schemes suitable for practical use were also given.

The present article is an abbreviated summary of some of the more important features of the former publication. The author states that it is best to fix the maximum dose in a cross-section of the body to be irradiated at 100 per cent and to express all other measured doses in relation to this. In the isodose charts reproduced the factors of irradiation are: half value layer of 0.7 mm. of copper, height of the axis field, 15 cm., and target axis distance, 50 cm. The size of the axis field, the rotation angle, and the axis dose (dose at the rotation axis in relation to free air dose at target axis distance) are stated for each chart.

The following concrete examples of rotational roentgen therapy are discussed in considerable detail: (1) skull, centering on the pituitary fossa with full rotation (360 degrees) and semirotation (180 degrees) over the side; (2) thorax, centering on an esophageal carcinoma at the level of the bifurcation of the trachea or seventh thoracic vertebra with 360 degree rotation; (3) pelvis, centering on the middle at the level of the symphysis (plane I), through the middle of the pelvis (plane II), and through the promontory (plane III) with 360 degrees of rotation, 180 degrees anterior and lateral rotation, and 90 degrees bilateral rotation, or a combination of several of these.

In general, it was found that in the skull the isodose curves plotted by the author did not differ much from those in cylindrical phantoms, but in the thorax and especially in the pelvis there were marked deviations. It seems that air and bone are two factors which affect the configuration of the isodose curves in a very decisive manner. Therefore, rotational roentgen therapy should not be used indiscriminately for any task, but should be planned as carefully as other methods of roentgen irradiation.

T. LEUCUTIA, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

An Experimental Study of the Distribution of Potassium in the Body, and of Its Excretion in Instances of Massive Intravenous Administration (Eine experimentelle Untersuchung ueber die Kaliumverteilung im Organismus und Kaliumausscheidung bei ausgiebiger intravenoeser Kaliumzufuhr.) R. KEUHLMAYER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 271: 475.

The fact seems to be established that there is a diffusion of the potassium-ion from the plasma into the interstitial fluids, and on into the intracellular fluids. Since, however, the diffusion between the plasma and the interstitial fluids occurs so readily that the potassium levels between these two fluids are practically equal, the author has limited this study to the behavior of the potassium diffusion processes between the plasma and the intracellular fluids. The fluids within the erythrocytes are, of course, included in the latter component.

Thirteen patients whose fluid metabolism was proved, by laboratory findings and by a water test, to be normal were given intravenous injections of potassium chloride in a 5 per cent dextrose solution. The amounts of this solution and the tempo of injection were varied within wide margins.

The giving intravenously of large amounts of potassium-ion, a cardiotoxin, might at first seem risky, since this substance might obviously result in irritative manifestations leading even to cardiac arrest; however, the author has been able to show that the administration of conserved blood, even in large amounts, which may come to contain as much as 400 mgm. of potassium-ion (slow diffusion of the ion from the erythrocytes back into the plasma), does not produce any notable increase in the potassium-ion level of the plasma. Thus it was concluded that a potassium-ion dosage of as much as 1,000 mgm. per hour can be endured without the slightest danger to the recipient. In fact, in the United States the preoperative administration of potassium intravenously is a matter of routine.

The determination of the titre of potassium-ion in the fluids was done with the flame-photometer method of Schuhknecht and Weibel—the method of Kramer and Tisdall being, in part, carried out without appearing to provide any marked difference in results. For the determination of the relationship between body weight and plasma volume, dependence was placed upon the figures of Auerswald (*Wien. Z. Nervenheilk*, 1950, 1: 1) and on figures of Auerswald yet to be published.

The patient material was divided into 3 groups. The first group (4 patients) was given 125 mgm. of potassium-ion every 15 minutes for a period of 60 minutes (total dosage 500 mgm.), and the urinary excretion, the plasma level, and the total quantity retained was determined at 15 minute intervals. The second group (3 patients), under identical conditions, was given 166.6 mgm. every 15 minutes for a total period of 45 minutes (total dosage 500 mgm.). The third group (5 patients) was given 250 mgm. every 15 minutes for total periods (in cases 9 to 11) of 30 minutes (total dosage 500 mgm.) and of (in cases 12 and 13) 60 minutes (total dosage 1,000 mgm.).

Detailed tables of figures for each group are given; however, they show in general that when the speed of injection does not exceed 12.9 mgm. of potassium-ion per minute, 14.5 per cent of the administered potassium will be excreted through the kidney, 78 per cent will remain in the tissues, and 7.5 per cent will be retained in the plasma.

When the intravenous infusion is started there are a few minutes—before the process of diffusion between the plasma and the tissue fluids begins—in which the potassium-ion level of the plasma tends to rise above the 14.5 per cent discussed above; however, after this interval the diffusion process speeds up, proportionally to the speed of administration, to keep the plasma level at the level of 7.5 per cent until the limit of 12.9 mgm. of potassium-ion per minute is reached.

When the speed of administration exceeds that of 12.9 mgm. of potassium-ion per minute, the diffusion will not accelerate. The urine by this time seems also to have reached its highest level of excretion with the result that the safety-valve process of diffusion, here described, breaks down and the potassium-ion tends to pile up in the plasma with evident danger to the patient's health, and even his life. The author was afraid to pursue his studies beyond this limit.

It is thus obvious that in pathologic conditions (chronic nephritis, oligurias, anurias, morbus Addison, as well as in the excessive administration of potassium) the diffusion process is disturbed. In these instances it is obvious that it would be easy to produce toxic manifestations with the intravenous administration of potassium. Such toxic episodes have been reported in the pediatric literature (*J. Pediat.*, 1946, 28: 550). JOHN W. BRENNAN, M.D.

Acute Progressive Unrelenting Renal Failure. E. E. MUIRHEAD and J. A. STIRMAN. *Surgery*, 1952, 32: 43.

Prolonged peripheral circulatory failure, possibly modified by the infusion of blood or crystalloid solutions, is associated with acute renal failure. In 10 per cent of patients who had acute renal insufficiency at a general hospital, the syndrome of progressive unrelenting renal failure was observed. The clinical and pathologic features differentiate this type of acute renal failure from the usual type.

In the usual type of acute renal insufficiency (lower nephron nephrosis) a progressively increas-

ing flow of urine occurs within 10 days; however, in the 10 patients studied, only a slight rise in the flow occurred after about a week of sustained oliguria. Projection of this curve of urinary volume forward would indicate that diuresis might be expected in from 20 to 35 days.

In the common form of acute renal insufficiency, hypertension is unusual. In these patients, the blood pressure during the first week gradually rose to levels of 150 to 210 systolic and 100 to 130 diastolic, and was sustained at these high levels.

There was a rapid rise in blood urea to levels of around 400 mgm. per cent during the first week, and if extrarenal measures of clearing waste products were not instituted, the level became even higher. Hypochloremia and severe acidosis were commonly seen. Of the 4 patients in whom serum potassium levels were determined, only 1 patient showed hyperkalemia. In 4 others, the threat of hyperkalemia was minimized by peritoneal dialysis. Mental disturbances, such as drowsiness, confusion, irrational behavior, and even mania, were observed in 5 to 8 days. In spite of repeated blood transfusions and in the absence of appreciable external loss, a persistent anemia was noted. Respiratory difficulty with tachypnea was noted in half of the patients, though evidence of heart failure and/or pulmonary edema was lacking. Bloody diarrheal stools were noted in 5 patients.

Death occurred in 9 to 22 days after onset of renal failure. Important pathologic changes were seen in the kidneys, lungs, liver, gastrointestinal tract, and brain. Pathologic changes involved all portions of the renal tubule, and for this reason the term "upper and lower nephron nephrosis" is applicable. Fibrinous alveolitis was encountered in 6 patients. The weights of the hearts were at upper limits of normal, and in 6 hearts pathologic changes were present. There was evidence of damage to the central portions of the lobules of the liver. Nerve cell damage and focal ring hemorrhages were present in the brain. Edema, hyperemia, and ulcerated lesions of the gastrointestinal tract were common.

There were two major disturbances in these patients: shock and uremia. It is plausible to consider shock as the cause of the widespread tissue injury, including the nephropathy. If a state of noncirculatory irreversible shock is the sole cause of death, then the therapeutic outlook is poor, but if the uremic state is an addative burden or the sole cause of death, then the outlook is altered. If extrarenal measures will promote survivals of 20 to 35 days, at which time renal recovery may be expected, the prognosis may be improved.

J. A. STIRMAN, M.D.

Spontaneous Gangrene in Infancy. GEORGE E. STOKES and HARRIS B. SHUMACKER, JR. *Angiology*, 1952, 3: 226.

The occurrence of spontaneous peripheral arterial occlusion in the newborn and young infant is rare. The authors found only 47 cases in the literature, and they present 4 new cases with complete clinical data and photographs. All 4 patients were seriously ill with one of the following conditions: hydrocephalus, uremia, eczema, and pneumonia. All were dehydrated, febrile, and apathetic, perhaps augmenting the coagulability of the blood. Further conditions were the occurrence of arterial occlusion after a brief period of hypotension in one instance, and shortly after a femoral venipuncture in another.

The mortality in the 51 recorded instances was 47 per cent and the deaths were obviously directly proportional to the extent and location of the gangrene.

Many factors are mentioned in the literature as causes of arterial occlusion, but no one single factor accounts for the majority of cases. Birth injuries, sepsis, intimal agglutination, congenital heart disease, thrombosis of the ductus arteriosus, thrombosis of umbilical arteries, and arteriospasm have all been incriminated and sometimes adequately demonstrated by postmortem examination. Certain considerations appear to be common in the majority of cases: first, the preponderance of cases occurring within 15 days after birth suggesting some relationship to postnatal circulatory changes, and secondly (a few cases), in the older age group the common occurrence of the accident during a critical illness with attendant dehydration, emaciation, fever, and infection.

It is believed that the apparently better collateral circulation in the infant as compared with the adult provides some protection against extensive tissue loss. It seems, therefore, important that therapy be conservative and that measures to increase collateral blood flow be utilized. Exceptions might arise in instances of severely infected gangrenous limbs in which amputation might be lifesaving. The authors followed a policy of conservatism when impending gangrene became evident. Surgery was performed only after the clear demarcation of viable and nonviable parts, and débridement was then carried out to hasten reconstructive surgery or skin grafting.

Initial treatment consisted of supportive therapy, including intravenous fluids, antibiotics, and rigid sterile technique in dressing the affected part. A sympathetic alcohol block was performed in 2 cases and repeated procaine blocks were used in a third case. In one instance a definitive transmetatarsal amputation was performed to gain a better functional result. In the others only skin grafting was deemed necessary, even on the plantar weight-bearing surfaces. To date, all grafts have remained healthy and serviceable. The best treatment is considered to be extreme conservatism combined with efforts to increase collateral blood flow.

ALBERT M. SCHWARTZ, M.D.

Malignant Synovioma. G. G. HARKNESS. *Austral. N. Zealand. J. Surg.*, 1952, 22: 60.

Two cases of malignant synovioma, one of which showed an unusual diversity of tissue differentiation, were recorded. The histological nature of tumors

and the conclusion that malignant synoviomas are connective tissue neoplasms which possess the same capacity of diverse tissue differentiation as is shown by the normal connective tissue of the synovium are discussed. ELY ELLIOTT LAZARUS, M.D.

DUCTLESS GLANDS

The Urinary Level of Total Estrogens and 17-Ketosteroids in Patients with Lactation Amenorrhea (Tasso urinario degli estrogeni totali e dei 17-chetosteroidi nell'amenorrea da allattamento). MARIO GERLI. *Ann. ostet. gin.*, 1951, 73: 1419.

The amounts of estrogens and 17 ketosteroids in the urine of 10 lactating women were determined by the authors at weekly intervals during one lunar month. Various postpartum periods were selected for this study. Fluctuations of the level of total estrogens were related to the endocrine activity of the ovaries. In patients who began menstruating shortly after the observation, the fluctuations of the estrogen levels in the urine were more pronounced and approached those found in women with a normal menarche.

Similar phenomena were observed concerning the elimination of 17-ketosteroids.

The authors conclude that during lactation amenorrhea, close relations exist between the ovaries and the suprarenal cortex.

JOSEPH K. NARAT, M.D.

EXPERIMENTAL SURGERY

Alterations in the Peripheral and Caval Venous Pressure After Intravenous Administration of Fluids (Sulle modificazioni pressorie nel sistema venoso periferico ed in quello delle vene cave dopo infusioni di liquidi). NICOLA DEL BELLO and DOMENICO PONTICELLI. *Arch. ital. chir.*, 1952, 75: 53.

Recent advances in the field of thoracic surgery require an increasing knowledge regarding the hemodynamics in general and the venous pressure in particular. The clinical importance of this very problem has been clearly recognized and has led to the publication of a considerable number of articles. This (mostly recent) literature has been reviewed by the authors who carried out an experimental study in order to determine the changes occurring in the venous pressure of the peripheral as well as of the caval system after the intravenous administration of certain fluids.

The influence of several factors such as the condition of the cardiac muscles and the pleuropulmonary system, the presence of posthemorrhagic shock, the speed of infusion, as well as the amount and type of the injected fluid had to be taken into consideration. However, if certain questions relating to these various factors did arise, answers to all of them were not found in the present study.

The experimental work was performed on dogs. In some animals conditions similar to those existing in hemorrhagic collapse were created by the withdrawal of a certain amount of venous blood. In several other dogs normal conditions were maintained. In both groups of animals the venous pressure in the aforementioned territories was measured before, during, and after the intravenous injection of normal saline, isotonic glucose solution, subtosan, or citrated blood. The rate of injection as well as the quantity of fluid were purposely varied. All animals received heparin as a prophylactic measure.

The authors found that the administration of all these fluids produced an increase in venous pressure which was more pronounced in the peripheral than in the caval system. This increase in pressure was influenced very little, if at all, by the type of fluid, but was influenced greatly by the total amount and especially by the speed of administration. These findings were still more evident in the animals which were in hemorrhagic collapse.

The authors briefly discuss the importance of tachycardia and of the increased urinary output encountered in a certain number of dogs. The intensity of the tachycardia is found to be independent of the type of perfused fluid.

R. SCHOBINGER VON SCHOWINGEN, M.D.

An Experimental Study on the Tissue Reactions Occurring in Parenchymatous Organs Around Various Types of Suture Material (Studio sperimentale sulla reazione tissurale di organi parenchimali a vari materiali di sutura). GIOVANNI D'AMICO. *Arch. ital. chir.*, 1952, 75: 67.

The author introduces the subject by presenting an extensive review of the literature and a series of photomicrographs illustrating his observations.

The question of the manner in which the various tissues react in the presence of different kinds of suture material is not a recent one. The study of this very problem, however, finds a fresh impulse with the use of any new product.

Especially studied were the histopathologic changes occurring in parenchymatous organs after the introduction of approximately equally sized fragments of nylon, catgut, silk, cotton, and linen into the spleen and liver of 9 dogs. The animals were sacrificed after periods ranging from 3 to 40 days.

The histologic examination of the various fragments of tissue revealed that catgut induced an exudative type of reaction, while the changes observed around cotton and linen were those of a granuloma. The presence of silk and nylon on the other hand stimulated a foreign body reaction rich in fibroblasts.

R. SCHOBINGER VON SCHOWINGEN, M.D.

The Healing of Aponeurotic Incisions. D. M. DOUGLAS. *Brit. J. Surg.*, 1952., 40: 79.

Realizing that muscle, peritoneum, and skin are of little value in maintaining the integrity of the abdominal wall, the author investigated the rate of wound healing in aponeurotic tissue in an attempt to determine how soon an incised wound in aponeurosis reaches the tensile strength of its parent tissue.

The lumbar aponeurosis of adult rabbits was utilized and two transverse incisions 5 cm. apart and 2 cm. long were made in the aponeurosis at right angles to the spine. They were immediately sutured with four interrupted sutures of No. 00000 serum-proofed silk.

At 2 day intervals the animals were killed, the skin of the back was removed, the stitches in the aponeurosis were removed, and then strips of aponeurosis were removed. Two similar strips of aponeurosis, one intact and the other containing two incised wounds, were obtained. Each was divided into an upper and a lower half and tested for tensile strength in a mercury tensiometer. One hundred and twenty animals were used in the study.

The author has analyzed his sources of error in mensuration, in the controls, in the influence of the presence of sutures, and in the possible cutting out of sutures. It was found that tensile strength could not be detected in the incised wounds until the sixth day. All wounds showed measurable tensile strength by the eighth day and thereafter a rapid increase until about the end of the second month when the curve of healing began to flatten out. The curve of healing was exponential and had a linear form when time was plotted on a logarithmic scale. This type of curve is characteristic of general growth curves. At the end of 2 weeks the values were about 20 per cent of normal, at the end of a month at 50 per cent, at 2 months between 60 and 80 per cent, and at 1 year they were up to 90 per cent in some cases. In occasional instances the values in wounds as old as 364 days were commonly only 50 per cent of that in the controls.

The author believes that a well co-ordinated process controls wound healing and that co-ordination is at least in part systemic. It has been previously shown that if 2 wounds are inflicted in the same animal at intervals of 10 days, the second wound heals more quickly than the first. This is explicable only if some systemic control of wound healing is postulated. It was also noted that aponeurosis seems to unite much more slowly than does skin for it had previously been found in experimental animals that skin wounds reached their maximal strength in 14 to 21 days, whereas in this study the same figure for aponeurosis was 200 to 300 days. This may be due to the fact that aponeurosis is one of the most avascular tissues in the body. In a large majority of instances the wounds were weaker than the parent tissues even at the end of one year. In other words, the infliction of a wound in aponeurosis left a weakness which was in all probability permanent.

The author suggests that the logical result of this work is to treat wounds in aponeurosis in surgical patients as potential hernias, i.e., they should be repaired, not merely sutured. The simplest way of doing this is to use many fine unabsorbable sutures in the aponeurotic layers.

ALLAN D. CALLOW, M.D.